Chapter-1

Financial Planning and Forecasting of Financial Statement

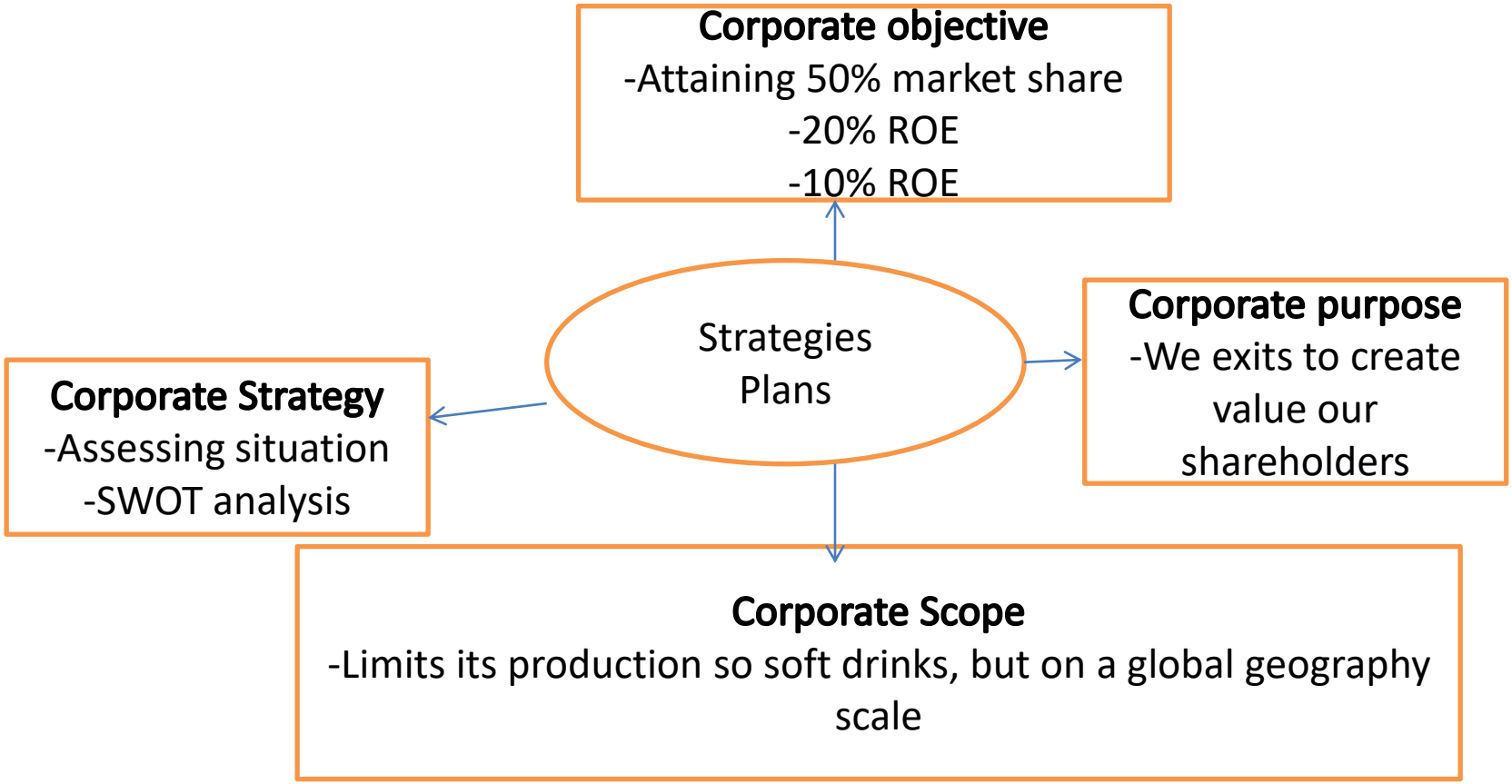
Strategic Plans

- Strategic plans are the stream of long term plans to help achieve corporate objectives.
- Strategic planning is a tools for organizing the present on the basis of the projections of the desire future.
- Strategic plan is a road map to lead an organization from where it is now to where it would like to be five or ten years.
- Strategic planning is the process of clarifying an organization's mission, then identifying goals, strategies and resources needed to achieve that mission.
- Strategic planning is an important function of top-management.

Strategic planning enables the manager to answer several questions including:

- What is the organization's position in the market?
- What does the organization want the position to be?
- What trends and changes are occurring in the market?
- What are the best alternatives to help achieve these goals?

Elements of Strategic Plans

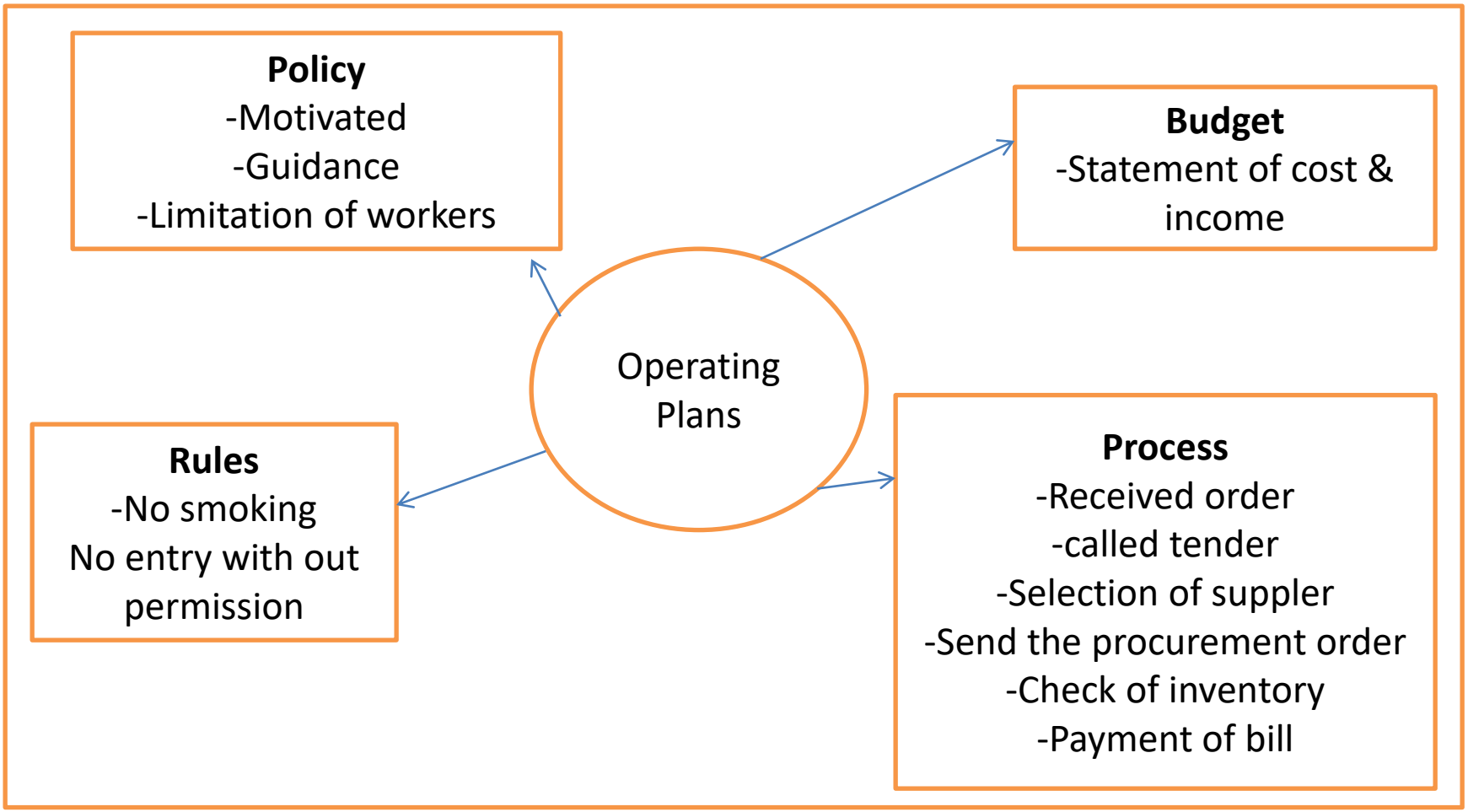


- The corporate purpose states the general philosophy of the business.
- The corporate scope states the line of business and geographical area of operation of a business.
- The objectives are goals that guide management to achieve desired outcomes.
- The strategies are broad action plans to attain the goals.

Operating Plans

- Operating plans provide detailed implementation guidance, based on the corporate strategy, to help meet the corporate objectives.
- Operating plan is a detail guideline for effective implementation of corporate strategies, which helps achieve corporate objectives.
- Operating plans could be formulated for any time horizon; however, five year planning horizon is the most common practices.

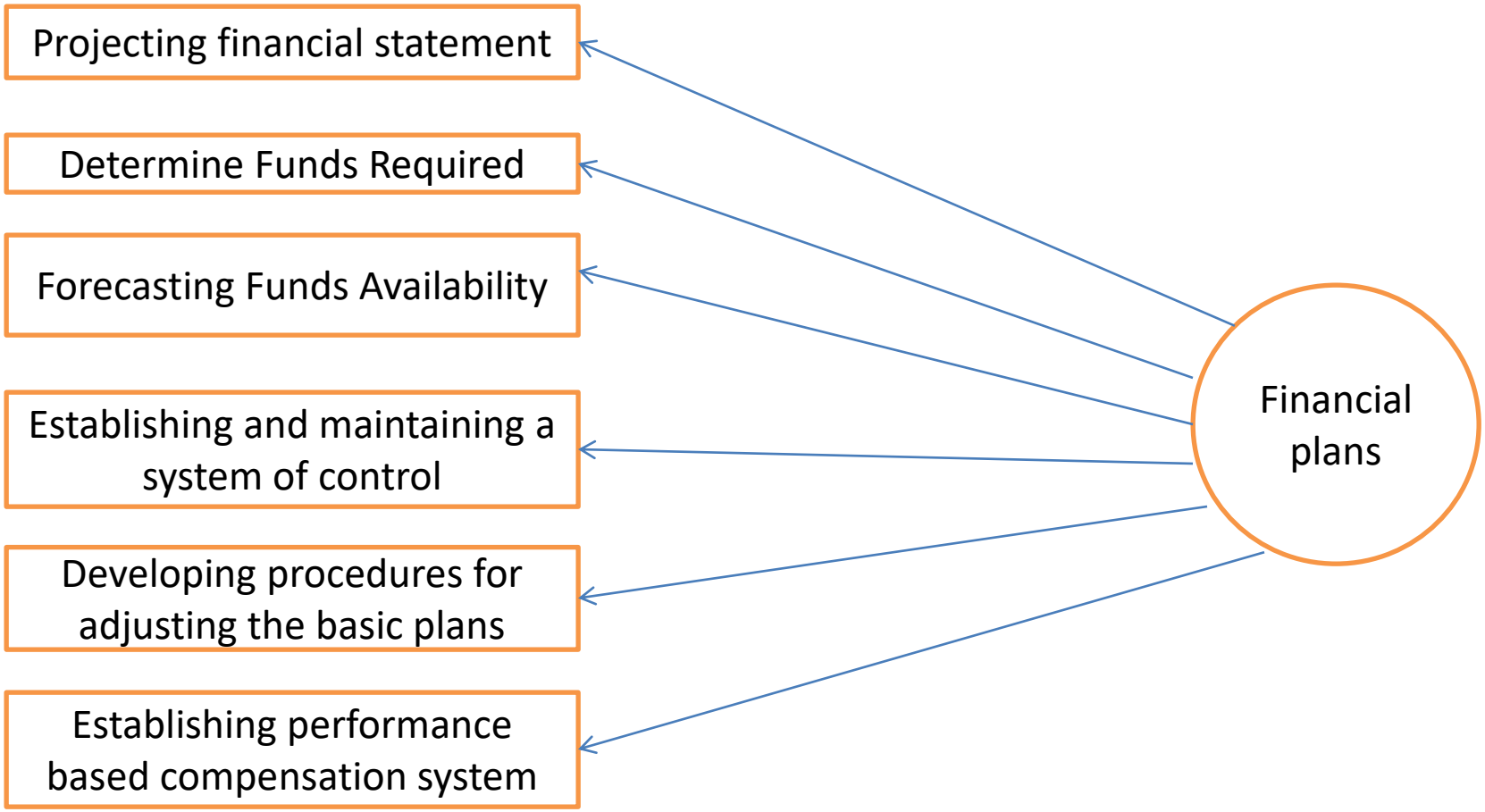
Operating plans



Financial Plans

- The financial plan refers to the projection of future financial course of action carried out for efficient execution of operating plans and effective accomplishment of corporate objectives.
- Financial plan is the important part of operating and existence of any firm as it provides road map for guiding, co-ordating and controlling the firm's financial action in order to achieve its objectives.

Process of Financial Plans



Sales Forecast

- Sales forecasts are the forecast of firm's units and rupees for some future period; it is generally based on past and recent sales trends plus forecasts of the economic prospects for the nation, region, industry and so forth.
- There are some of the factors which should be considered well before making or developing sales forecast;

-Divisional forecast

-Economic activity forecast

-Forecasting marketing strategy

-Combination of inflation with sales growth

-Advertising campaigns, promotional discounts, credit terms etc.

Financial Planning and Forecasting

- Financial planning is the projection of sales, income and assets based on alternative production and marketing as well as the determination of the resources needed to achieve these projections.
- Financial forecasting is an integral part of financial planning. It uses past data to estimates the future financial requirements.
- The process of estimating the fund requirement of the firm and determining the sources of fund is called financial planning and forecasting, the implementation of financial planning is called financial control.

Methods of Financial Forecasting

- There are various methods of financial forecasting. The one of the most method is percent of sales method.
- It is one of the simple methods of forecasting financial statement variables.
- Application of this method is based on the two basic assumptions;

-Frist, all items of balance sheet except some liabilities are proportionately related to sales volume.

-Second, most of the current balance sheet items are justifiable for the current sales volume.

Percentage Sales Methods

Step 1. Forecasted income statement:

The first step in using the percentage of sales method is to forecast the next year's income statement to estimate income and additional to retained earnings. Forecasted income statements are the following assumption.

- The percentage of sales method assumes initially that all costs except depreciation are a specified percentage of sales.
- Fixed cost will be increased, if the company operate at fully capacity.
- Interest amount and tax rate are remained constant but interest amounts are changed when external financing requirement are analyze in a later steps.
- If all income is not paid in dividend then retained earnings will increase.

Illustration 1

Income statement of XYZ Company for 2016

Sales revenue	Rs.500,000
Cost of goods sold	(200,000)
Gross profit	300,000
Fixed operating cost (Depreciation)	(100,000)
EBIT	200,000
Interest	(50,000)
EBT	150,000
Tax (40%)	(60,000)
Net income	90,000
Dividend (60%)	(54,000)
Additional to returned earnings	36,000

In 2017, the sales are expected to increased by 25%

Required:

(i) Prepare forecasted income statement assuming that the company is operating at fully capacity.

(ii) Prepare forecasted income statement assuming that the company is not operating at fully capacity.

Solution :

(i) Forecasted Income Statement of xyz company for 2017 (Fully capacity assumption)

Particular	Forecast for 2006
Sales revenue (1.25)	625,000
Less: Cost of goods sold (1.25)	250,000
Gross profit	375,000
Less: Fixed operating expenses (1.25)	125,000
EBIT	250,000
Less: Interest	50,000
EBT	200,000
Less: Tax (40%)	80,000
Net Income	120,000
Less: Dividend (60%)	72,000
Additional to Return earning	48000

Note: if dividend payout ratio is not given:

DPR or D/P ratio = $\frac{Dividend}{Net\ income} = \frac{54000}{90000}$ =0.60 or 60%

Growth rate in dividend(g) =$\frac{New\ dividend\ -Old\ dividend}{Old\ dividend} \times 100$

= $\frac{72000-54000}{54000} \times 100 = 33.33\%$

(ii)Forecasted Income Statement for 2017 (Sufficient idle capacity assumption)

Particular	Forecasted for 2006
Sales (1.25)	625,000
Less: Cost of goods sold (1.25)	250,000
Gross profit	375,000
Less: Fixed operating expenses	100,000
EBIT	275,000
Less: Interest	50,000
EBT	225,000
Less: Tax (40%)	90,000
Net Income	135,000
Less: Dividend (60%)	81,000
Additional to Return earning	54000

Step 2. Forecast the balance sheets :

The second step in using the percentage of sales methods is to forecast the next year's balance sheet to estimate the additional fund needed. Forecast the balance sheets are the follows assumptions.

- All assets accounts can be assumed to increase directly as percentage of sales, if firm operating at fully capacity used.
- If the firm is not operating at fully capacity used then fixed assets will not change but all current assets will increase as a percentage of sales.
- All current liabilities accounts (i.e. account payables, creditors, bills–payable, and accruals except notes–payable) can be expected to increase spontaneously with sales.
- All other financial accounts such as note–payable, long–term debts, preferred stocks and common stocks are not directly related to sales.
- AFN can be determined the projected the total assets minus projected total liabilities and equity capital.
- The firm raises the AFN through borrowing or by selling new common stocks.
- Additional retained earnings can be calculated by using the following equation.

Additional retained earnings = $S_1 \times M \times b$

Where,

S_1	= Projected sales
M	= Profit margin
b	= retention ratio
b	= 1 – D/P ratio
D/P ratio	= Dividend payout ratio

illustration

The balance sheet of a company as on 31st Dec. 2016 is shown below:

Liabilities	**Amount**	**Assets**	**Amount**
Account payable	2000	Cash	500
Notes payable	500	Receivable	4500
Accrued wages and taxes	2500	Inventories	10000
Total current liabilities	5000	Total current asset	15000
Mortgage bonds	7500	Net fixed assets	15000
Share capital	2500		
Retained earnings	15000		
Total liabilities and equity	30000	Total assets	30,000

The company is operating at fully capacity and sales amounting Rs.20,000. The profit margin on sales was 10% and distributed 60% after tax profit to the shareholders. The company expects sales to increase to Rs.30,000. How much additional financing will the capacity required?

Given,

Old sales (So) = Rs.20,000

Profit margin (M) = 10%

Dividend payout ratio (DPR) = 60%

Retention ratio (b) = 1- DPR = 1-0.60= 0.40

New sales (S1) = Rs.30000

Growth rate in sales (g) = $\frac{S1-So}{So} = \frac{Rs.30000-Rs.20000}{Rs.20000} \times 100 = 50\%$

Additional fund needed (AFN) = ?

Projected Balance Sheet

Liabilities	Amount	Assets	Amount
Account payable(1.50)	3000	Cash(1.50)	750
Notes payable	500	Receivable(1.50)	6750
Accrued wages and taxes(1.50)	3750	Inventories(1.50)	15000
Total current liabilities	7250	Total current asset	22500
Mortgage bonds	7500	Net fixed assets(1.50)	22500
Share capital	2500		
Retained earnings(15000+1200)	16200		
Additional funds	11550*		
Total liabilities and equity	45,000	Total assets	45,000

Working note:

Additional retained earning = S1× M×b = Rs.30000×0.10×0.40 = Rs.1200

Illustration 3.

The company planned to tap 25% of funds from notes payable, 60% through issue of common stock and rest from issue of bond. Prepare the balance sheet after adjusting above financing sources.

Solution:

Projected Balance Sheet

Liabilities	Amount	Assets	Amount
Account payable	3000	Cash	750
Notes payable	3387.5	Receivable	6750
Accrued wages and taxes	3750	Inventories	15000
Total current liabilities	10137.5	Total current asset	22500
Mortgage bonds	9232.5	Net fixed assets	22500
Share capital	9430.		
Retained earnings	16200		
Total liabilities and equity	45,000	Total assets	45,000

Financing plan:

Notes payable $= \frac{25}{100} \times$ Rs.11550 = Rs.2887.5

Bonds $= \frac{15}{100} \times$ Rs.11550 = Rs.1732.5

Common stock $= \frac{60}{100} \times$ Rs.11550 = Rs.6930

Most firms forecast there capital requirement by construction pro–forma income statements and balance sheets as described above. If the ratios are expected to remain constant, then the following formula can be used to forecast financial requirement.

$$\text{AFN} = \left(\frac{A^*}{S0} - \frac{L^*}{S0}\right) \times \Delta S - S_1 \times M \times b$$

$$\text{AFN} = (A^*\% - L^*\%) \times \Delta S - S_1 \times M \times b$$

A^* = A designates total assets ,if the firm is operating at fully capacity.

S_0 = Sales during the last year

$\frac{A^*}{So}$ = Assets to sales ratio or capital intensity ratio.

L^* = Current liability except notes payables

$\frac{L^*}{S0}$= Liabilities that increase spontaneously as a percentage of sales or spontaneously generate financing per Rs.1 increase in sales.

S_1 = Total projected sales for next year.

ΔS = Change in sales = $S_1 - S_0$

M = Profit margin or profit per Rs.1 of sales (M =)

b = Retention ratio

b = 1- D/P ratio (DPR)

D/P ratio = $\frac{DPS}{EPS}$ or $\frac{Dividend}{Net\ Income}$

1. Capital intensity ratio = $\frac{A^*}{S0}$
2. Additional investment in assets = $\frac{A^*}{S0} \times \Delta S$
3. Additional amount of spontaneous financing = $\frac{L^*}{S0} \times \Delta S$
4. Additional to retained earning = $S_1 \times M \times b$

Solution:

AFN = $(\frac{A^*}{S0} - \frac{L^*}{S0}) \times \Delta S - S_1 \times M \times b$

= $(\frac{Rs.30000}{Rs.20000} - \frac{Rs.4500}{Rs.20000}) \times$ Rs.10000 – Rs.30000 $\times$ 0.10 $\times$ 0.40

= Rs.11550

5. Total assets =Total debt + Total equity
6. Total debt = Current liability + Long term debt
7. Total equity = Common stock + Retained earning

Percentage of external fund requirement (PEFR)

Percentage of increase in sales that will have to be financed externally (percentage of external fund required or PEFR) as a function of the critical variables involved in calculated by using following formula.

$$\text{PEFR} = \left(\frac{A^*}{S0} - \frac{L^*}{S0}\right) - \frac{Mb}{g}(1 + g)$$

Illustration 5.

Sakha company has the percentage of relevant assets on sales is 65 percent and percentage of trade liabilities on sales is 25 percent. The profit margin of the company is 8 percent and dividend payout ratio is 50 percent. If its growth rate on sales is 15 percent per year. Find the percentage of the sales increase in coming year must be financed externally.

solution

Given

Percentage of relevant assets on sales (A^*/S_0) = 60% or 0.65

Percentage of trade liabilities on sales (L^*/S_0) = 25% or 0.25

Profit margin (M) = 8% or 0.08

Dividend payout ratio = 50% or 0.50

Retention ratio (b) = 1 – 0.50 = 0.50

Growth rate on sales (g) = 15% or 0.15

PEFR = ?

We have,

$$\text{PEFR} = \left(\frac{A^*}{S0} - \frac{L^*}{S0}\right) - \frac{Mb}{g}(1 + g)$$

$$= (0.65 - 0.25) - \frac{0.08 \times 0.50}{0.15} \times (1 + 0.15)$$

$$= 0.40 - 0.3067 = 0.0933 \text{ or } 9.33\%$$

Therefore, 9.33% of sales increase must be financed externally when sales increase by 15% per year.

Factor affecting the AFN

(a) Sales growth (ΔS) :

Rapidly growing companies require large increases in assets, other things held constant, hence the higher the need for external financing.

(b) Capital intensity :

The amount of the assets required per rupee of sales, is called Capital intensity ratio. This ratio has a major effect on capital requirements. Companies with higher assets to sales ratios require more assets for a given increase in sales, hence a greater need for external financing.

(c) Spontaneous liabilities to sales ratio :

Companies that spontaneously generate a large amount of liabilities from accounts payable and accruals will have a relatively small need for external financing.

(d) Profit margin (M) :

The higher profit margin, the larger the net income available to support increases in assets, hence the lower the need external financing.

(e) Retention ratio (b):

Companies that retain more their earnings as opposed to paying them out as dividend will generate more retained earning and thus have less need for external financing.

AFN $= (\frac{A^*}{S0} - \frac{L^*}{S0}) \times \Delta S - S_1 \times M \times b$

Excess capacity adjustment Method

Illustration 8.

XYZ Company has Rs.3 million in sales and Rs.1.5 million in fixed assets. Currently, the company's fixed assets are operating at 90 percent of capacity.

(a) What level of sales could xyz have obtained if it has been operating at full capacity?

(b) What is XYZ's target assets / sales ratio?

(c) If XYZ's sales increase 15 percent, how large of an increase in fixed assets would the company need in order to meet its target fixed sales ratio.

Solution:

Given,

Sales = Rs.3million or Rs.30,00,000

Fixed assets = Rs.1.5 Million or Rs.15,00,000

Fixed assets operating capacity = 90% or 0.90

(a) Level sales for fully capacity

We have,

Fully capacity sales $= \frac{Actual\ Sales}{Percentage\ of\ capacity\ used} = \frac{Rs.30,00,000}{0.90}$ =Rs.33,33,333.33

(b) Target fixed assets/ Sales ratio

We have,

Target fixed assets to sales $= \frac{Actual\ fixed\ assets}{Full\ capacity\ sales} = \frac{Rs.15{,}00{,}000}{Rs.33{,}33{,}333.33} = 0.45$ or 45%

(c) Percentage increase in sales = 15%

Old fixed assets = Rs.1500000

Old sales = Rs.3000000

Increase in fixed assets =?

Now,

New sales = Old sales (1 + % increased in sales)

= Rs.3000000 (1 + 0.15) = Rs.3450000

Required level of fixed assets (new fixed assets)

= (Target fixed assets to sales ratio) $\times$ Projected sales

= 0.45 $\times$ Rs.3450000 = Rs.1552500

Increase in fixed assets = New fixed assets – old fixed assets

= Rs.1552500 – Rs.1500000 = Rs.52500

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Unit 2 : Portfolio Theory and Capital assets Pricing Model

Meaning of portfolio

Portfolio means making investment in more than one alternative at the same time. It is also called investment diversification or combination of investment. The portfolio theory was developed by Harry M. Markowitz on 1952, so it is also explain as the Markowitz portfolio. He was received the 'Nobel prize in economics' in 1990 for developing 'the theory of portfolio selection'.

'Do not put all your eggs in one basket'. If whole fund is invested in a particular asset or stock (share), risks become higher. But the investment is made in more than one asset, risk become lover because port from one area can compensate the loss in another asset. So investors, banks and other financial institutions prefer investment diversification. The main objective of portfolio is ; (a) Minimizing risk (b) Maximizing return. Based on investors' attitude towards risk, there are three types of investors.

a. Risk averter (who prefer less risky investment because they shy away from risk) – low CV.
b. Risk seeker (who prefer high risky investment because they enjoy risk) – High CV.
c. Risk neutral (risk neutrals investors are indifferent to risk)

Portfolio Return

1. **Portfolio realized return**

   $R_P = W_A \times R_A + W_A \times R_B$

2. **Portfolio expected or average return**

   $\bar{R}_P = W_A \times \bar{R}_A + W_B \times \bar{R}_B$

   $W_A + W_B = 1$

   W_A = Weight on investment A

   W_B = Weight on Investment B

   The portfolio returns on N assets case

   $R_P = W_A \times \bar{R}_A + W_B \times \bar{R}_B + W_C \times \bar{R}_C$

Illustration 7

Suppose Mr. Sharma purchase 200 shares of stock XYZ at Rs 200 each and 300 shares of stock ABC at Rs 200 each he expects the rate of return from XYZ and ABC are 15% and 20% respectively, Calculate his portfolio return.

Solution :

First : Calculation of weighted for each stock

Stock	No. of shares	Price per share	Value of shares	Weighted (w)

XYZ	200	Rs 200	Rs 4000	0.40 or 40%
ABC	300	Rs 200	6000	0.60 or 60%
		Total	10000	1or 100%

$\bar{R}_P = W_A \times \bar{R}_A + W_B \times \bar{R}_B$

$= 0.40\times 15\% + 0.60\times 20\% = 18\%$

Portfolio Risk(standard deviation)

$$\sigma_P = \sqrt{W_A^2 \cdot \sigma_A^2 + W_B^2 \cdot \sigma_B^2 + 2COV_{AB}\, W_A \cdot W_B}$$

Illustration 8

There are two assets and three states of economy with following probabilities and rate of return on stock R and stock S.

State of economy	Probability of state of economy	Rate of return on stock	
		A	B
Recession	0.20	–15%	20%
Normal	0.50	20	30
Boom	0.30	60	40

(a) Find out the expected return on each stock.

(b) Find out standard deviation on each stock.

(c) Find out expected return and standard deviation on portfolio if you put Rs.15000 in stock A and Rs.5000 in stock B given total investment of Rs.20000.

Solution

Ps	R_A	R_B	$P_S.R_A$	$R_A - \bar{R}_A$	$Ps(R_A - \bar{R}_A)^2$	$P_S.R_B$	$R_B - \bar{R}_B$	$Ps(R_B - \bar{R}_B)^2$	$P_S(R_A - \bar{R}_A)(R_B - \bar{R}_B)$
0.20	-15%	20%	-3	-40	320	4	-11	24.2	88
0.50	10	30	10	-5	12.5	15	-1	0.5	2.5
0.30	60	40	18	35	367.5	12	9	24.3	94.5
		$\sum P_S.R_A$ =25		$\sum P_S.(R_A - \bar{R}_A)^2$= 700		$\sum P_S.R_B$ = 11.6	$\sum P_S.(R_B - \bar{R}_B)^2$ = 49		$\sum P_S(R_A - \bar{R}_A)(R_B - \bar{R}_B)$= 185

a. Expected return on stock A ($\bar{R}_A$) = $\sum P_S.R_A$ = 25%;
Expected return on stock B ($\bar{R}_B$) = $\sum P_S.R_B$ = 11.6%

b. Standard deviation of stock A (σ_A) = $\sqrt{\sum P_S.(R_A - \bar{R}_A)^2}$ = $\sqrt{700}$ = 26.46%
Standard deviation of stock B (σ_B) = $\sqrt{\sum P_S.(R_B - \bar{R}_B)^2}$ = $\sqrt{49}$ = 7%
$COV_{AB} = \sum P_S(R_A - \bar{R}_A)(R_B - \bar{R}_B) = 185$

c. Investment amount of stock A = Rs.15000
Investment amount of stock B = Rs.5000
Total investment = Rs.15000 + Rs.5000 = Rs.20000

Weighted of stock A = $\frac{Rs15000}{Rs20000} = 0.75$

Weighted of stock B = $\frac{Rs.5000}{Rs.20000} = 0.25$

Now

$\bar{R}_P = W_A \times \bar{R}_A + W_B \times \bar{R}_B$

$= 0.75 \times 25\% + 0.25 \times 31\% = 26.5\%$

$\sigma_P = \sqrt{W_A^2 . \sigma_A^2 + W_B^2 . \sigma_B^2 + 2COV_{AB} W_A . W_B}$

$= \sqrt{(0.75)^2 \times (26.46)^2 + (0.25)^2 \times (7)^2 + 2 \times 185 \times 0.75 \times 25}$

$= \sqrt{393.824 + 3.0625 + 69.375} = 21.59\%$

Illustration 9

Stocks A and B have the following historical returns:

Year	Stock A's Returns, k_A	Stock B's Returns, k_B
2010	(18.00)%	(14.50)%
2011	33.00	21.80
2012	15.00	30.50
2013	(0.50)	(7.60)
2014	27.00	26.30

(a) Calculate the average rate of return for each stock during the period 2010 through 2014.

(b) Assume that someone held a portfolio consisting of 50 percent of stock A and 50 percent of Stock B. What would have been the realized rate of return on the portfolio in each year from 2010 through 2014? What would have been the average return on the portfolio during this period?

(c) Calculate the standard deviation of returns for each stock and for the portfolio.

(d) Calculate the coefficient of variation for each stock and for the portfolio.

(e) If you were a risk-averse investor, would you prefer to hold Stock A, Stock B, or the portfolio? Why?

Solution

a. Average rate of return for each stock

Year	R_A	R_B
2010	-18%	-14.5%
2011	33	21.8
2012	15	30.5
2013	-0.50	-7.60
2014	27	26.30

n = 5	$\sum R_A = 56.5$	$\sum R_B = 56.5$

$$\bar{R}_A = \frac{\sum R_A}{n} = \frac{56.5}{5} = 11.3\% \qquad \bar{R}_B = \frac{\sum R_B}{n} = \frac{56.5}{5} = 11.3\%$$

b. Realized rate of return on portfolio

Year	R_A	R_B	$R_P = W_A \times R_A + W_A \times R_B$
2010	-18%	-14.5%	0.50 × -18% + 0.50 × -14.5% = -16.25%
2011	33	21.8	0.50 × 33 + 0.50 × 21.8 = 27.4
2012	15	30.5	0.50 × 15 + 0.50 × 30.5 = 22.75
2013	-0.50	-7.60	0.50 × -0.50 + 0.50 × -7.60 = -4.05
2014	27	26.30	0.50 × 27 + 0.50 × 26.30 = 26.65
			$\sum R_P = 56.5$

Expected return on portfolio ($\bar{R}_P$) = $W_A \times \bar{R}_A + W_B \times \bar{R}_B$

= 0.50 × 11.3% + 0.50 × 11.3% = 11.3%

Or $\bar{R}_P = \frac{\sum R_P}{n} = \frac{56.5}{5} = 11.3\%$

c. Calculation of standard deviation for each stock and portfolio.

Year	$R_A - \bar{R}_A$	$(R_A - \bar{R}_A)^2$	$R_B - \bar{R}_B$	$(R_B - \bar{R}_B)^2$	$(R_A - \bar{R}_A)(R_B - \bar{R}_B)$
2010	-29.3	858.49	-25.8	665.64	755.94
2011	21.7	470.89	10.5	110.25	227.85
2012	3.7	13.69	19,2	368.64	71.04
2013	-11.8	139.34	-18.9	357.21	223.02
2014	15.7	246.49	15	225	235.5
n = 5	$\sum (R_A - \bar{R}_A)^2 = 1728.80$		$\sum (R_B - \bar{R}_B)^2 = 1726.74$		$\sum (R_A - \bar{R}_A)(R_B - \bar{R}_B) = 1513.35$

$$\sigma_A = \sqrt{\frac{\sum (R_A - \bar{R}_A)^2}{n-1}} = \sqrt{\frac{1728.80}{5-1}} = 20.8\%$$

$$\sigma_B = \sqrt{\frac{\sum (R_B - \bar{R}_B)^2}{n-1}} = \sqrt{\frac{1726.74}{5-1}} = 20.8\%$$

$$COV_{AB} = \frac{\sum (R_A - \bar{R}_A)(R_B - \bar{R}_B)}{n-1} = \frac{1513.35}{5-1} = 378.3375$$

$$r_{AB} = \frac{COV_{AB}}{\sigma_{AB}} = \frac{378.3375}{20.8 \times 20.8} = 0.874$$

Portfolio risk or portfolio standard deviation

$$\sigma_P = \sqrt{W_A^2 \cdot \sigma_A^2 + W_B^2 \cdot \sigma_B^2 + 2COV_{AB}\, W_A \cdot W_B}$$

$$= \sqrt{(0.50)^2 \times (20.8)^2 + (0.50)^2 \times (20.8)^2 + 2 \times 378.3375 \times 0.50 \times 0.50}$$

$$= 20.1\%$$

d. Coefficient of variation

$$CV_A = \frac{\sigma_A}{\bar{R}_A} = \frac{20.8}{11.3} = 1.84$$

$$CV_B = \frac{\sigma_B}{\bar{R}_B} = \frac{20.8}{11.3} = 1.84$$

$$CV_P = \frac{\sigma_P}{\bar{R}_P} = \frac{20.1}{11.3} = 1.78$$

e. If I am a risk- averse investor, i would prefer to hold the portfolio because standard deviation and coefficient of variation for the portfolio are lower than stock A and B.

Alternatively

Year	R_P	$R_P - \bar{R}_P$	$(R_P - \bar{R}_P)^2$
2010	-16.25%		
2011	27.4		
2012	22.75		
2013	-4.05		
2014	26.65		
n = 5			$\Sigma (R_B - \bar{R}_B)^2 = 1726.74$

$$\sigma_P = \sqrt{\frac{\Sigma (R_P - \bar{R}_P)^2}{n-1}} =$$

Minimum variance of portfolio

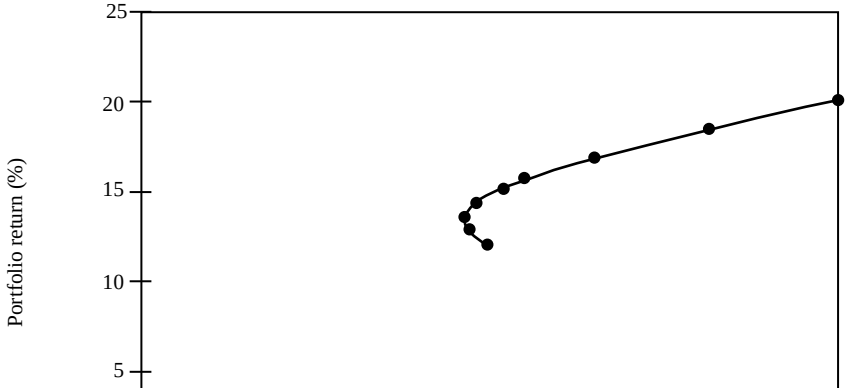
$$W_A = \frac{\sigma_B^2 - COV_{AB}}{\sigma_A^2 + \sigma_B^2 - 2\,COV_{AB}}$$

$W_B = 1 - W_A$

For example

Stock	Expected Return	Standard deviation	Covariance
A	20%	30%	45
B	12%	15%	

Calculate the expected return and risk(SD) of portfolio if WA = 100%,80%,60%,40%,20%,0%.



Efficient Portfolios

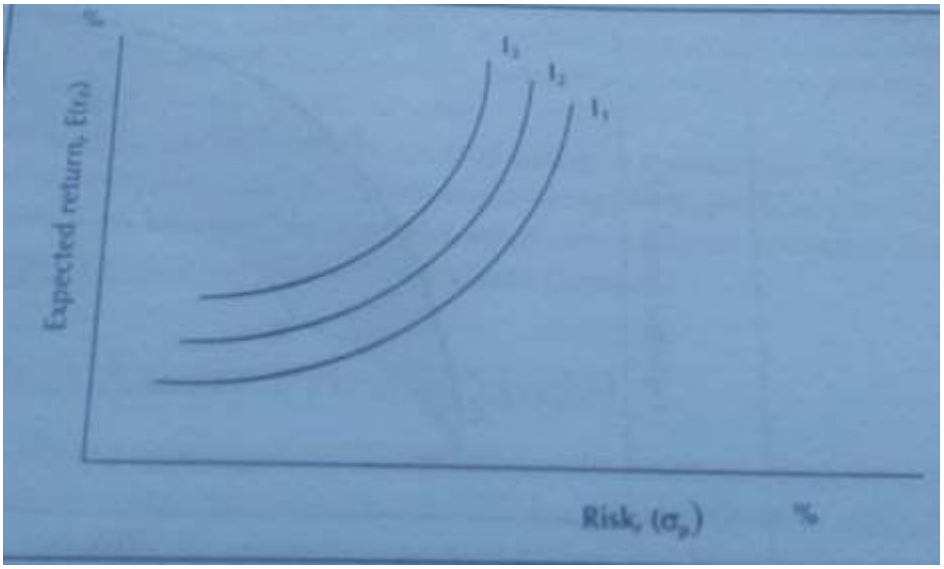
Efficient portfolio may be defined as the portfolio which;

- Provides the highest possible expected return for any degree of risk
- The lowest possible degree of risk for any expected return.

Portfolio	Expected return	Standard deviation (Risk)
A	8%	4%
B	8	6
C	10	4

Risk- Return Indifferent Curve

An indifference curve is the line connecting different portfolio (based on risk and return of portfolio) providing an equal level of satisfactory or utility to the investors. In other words, an indifference curve is defined as the line connecting different portfolio which the same utility or level of satisfaction to the investor.it can be drawn on two dimension figure where the horizontal line indicates risk as measured by the standard deviation and the vertical axis indicates reward as measured by expected rate of return. Risk return indifference curve have been presented in following figure.

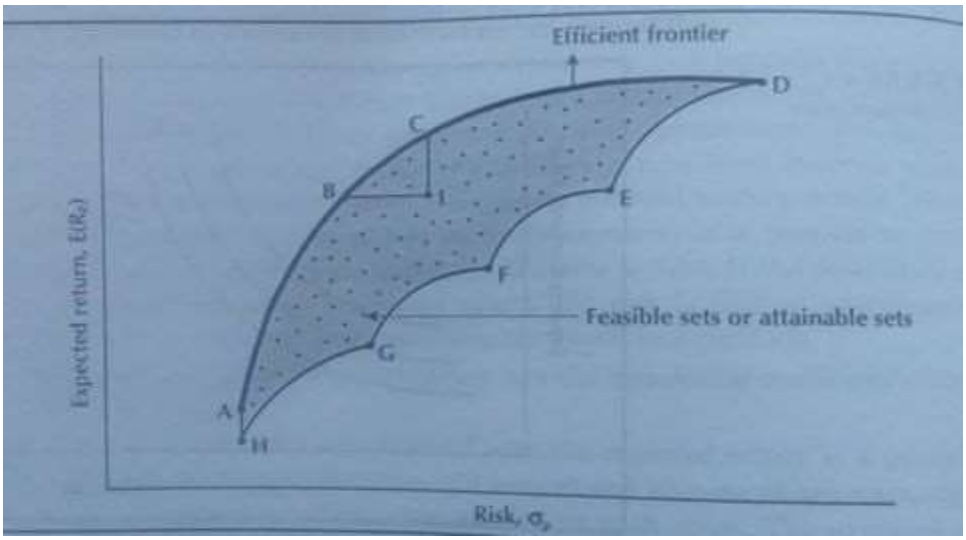


- Every point which lies on same indifference curve gives the same satisfaction.
- The upper risk return indifference curve gives higher level of satisfaction.

- In the above figure IC_2 gives higher satisfaction than IC_1 and IC3 gives higher satisfaction than IC2.
- Indifference curves cannot intersect with each other.
- Investors attempts to select higher indifference curve over the lower indifference curve.
- An investor may have more than one indifference curves representing different level of satisfaction.

Opportunity set

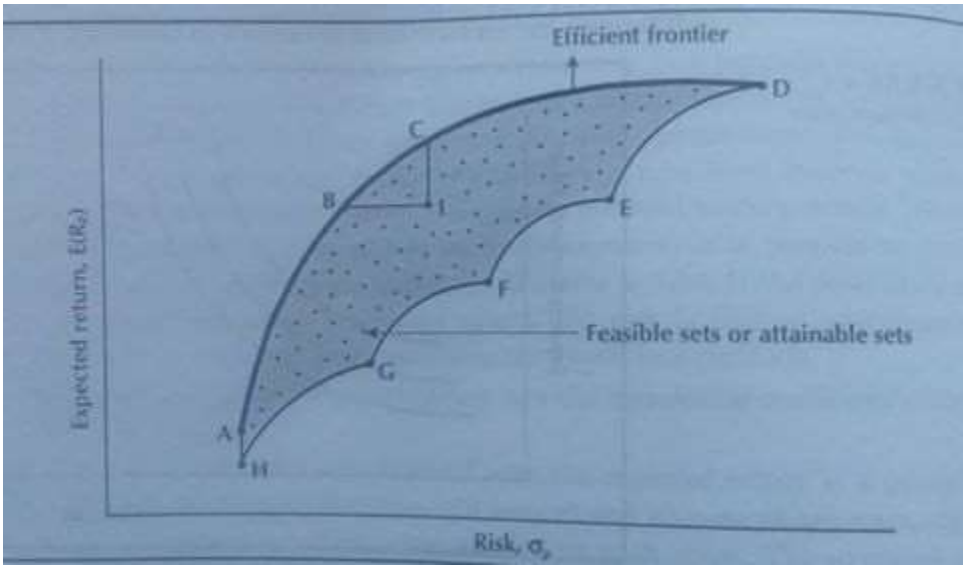
Opportunity set is that area which is occupied by the curve connecting both efficient and inefficient portfolio. In other words, the collective name for the risk and return of all possible portfolios from the given assets is known as portfolio opportunity set. It is also known as attainable set or feasible set.



In the above the collection of all possible portfolio options represented by the broken egg-shaped region is referred to as the feasible or attainable set. Thus the point circle of A, B, C,D,E,F,G and H are opportunity set.

Efficient Frontier

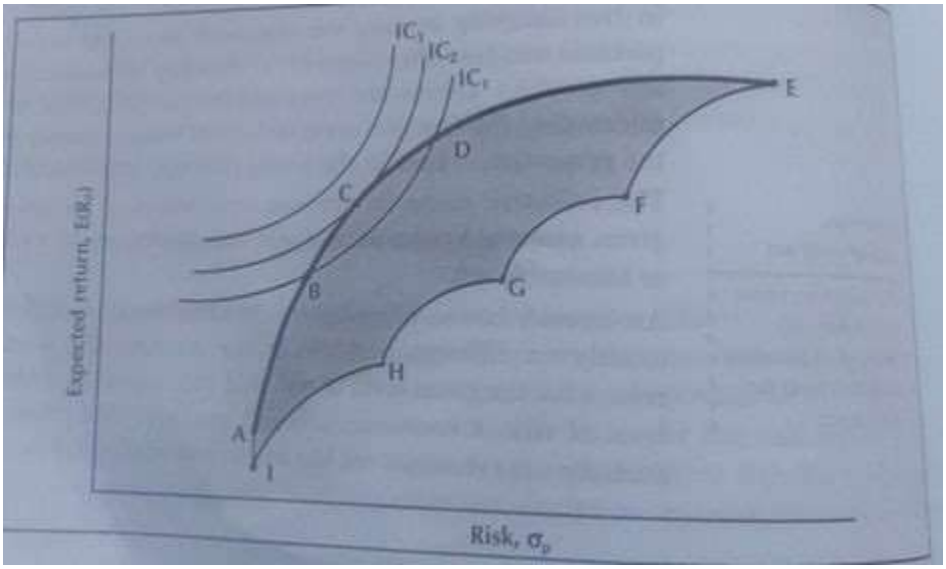
The line connecting an efficient portfolio having the highest return in the same level of risk (or lowest risk at same level of return) is known as efficient frontier.



- When comparing portfolio B and G , risk is almost same but every investor selects B because B has more return than G.
- But comparing A and B, A has lowest return as well as risk where B has higher return and risk. So both points are efficient portfolio.
- Comparing B,C and I: B and I have similar return but risk in B is lower than I. so, investor choose portfolio B . But comparing C and I one chooses C.
  However, all these portfolio(A,B,C,D,E,F,G,H and I) are not suitable for selection. Out of them, those portfolios (A,B,C and D) which are suitable for selection are called efficient portfolio and line connecting those superior set of portfolio is called efficient frontier.

Optimal portfolio

Optimal portfolio is that combination of investment in assets which helps investors to minimize risk if return is same or to maximize return if risk is same. The optimal portfolio is selected involving the risk return indifferent curve from above efficient frontier. The tangent point of risk return indifferent curve of efficient frontier is an optimal portfolio.



In the ab0ve figure, the portfolio C lies in the tangent point of IC_2 and the efficient frontier is the optimal portfolio. Portfolio on indifference curve IC_1 would not be selected because investor utility is higher for portfolio on IC_2 those on IC_1. Portfolios on IC_3, which have even higher utility, are not attainable. Thus, portfolio C is optimal for an investor.

Beta coefficient

The total risk of an asset can be partitioned into systematic and unsystematic risk. Systematic risk can't be diversified whereas unsystematic risk can be. The systematic risk or systematic part of the risk can be calculated by using a tool that is known as beta coefficient. It is an indicator of systematic risk of an asset. It measured sensitivity of return on risky assets to market return. The betas are used to calculate the required rate of return. The beta coefficient is found by dividing the combined risk (covariance between asset's return and market return) by variance of market return.

Mathematically, the systematic risk beta is measured as the covariance of the stock returns with the market returns expressed per unit of market variance as follow,

$$\beta_j = \frac{COV_{jm}}{\sigma_m^2} = \frac{r_{jm} \cdot \sigma_j \cdot \sigma_m}{\sigma_m \ \sigma_m} = \frac{r_{jm} \cdot \sigma_j}{\sigma_m}$$

β_j = Beta coefficient for asset j

COV_{jm} = Covariance between return of asset j and market

σ_j = standard deviation of asset j

r_{jm} = correlation coefficient between return of assets and market.

σ_m^2 = Variance of market return.

Note that the market return of security market such as NEPSE (Nepal stock exchange).

The beta of market portfolio (β_m) is always equal to 1. Because covariance between markets

returns with itself is the variance of the market (σm^2). The market beta is also called average sock's beta. The asset or stock that has beta less than 1 is trended as defensive assets (less risky than market). The asset that has beta higher than 1 is trended as aggressive asset (more risky than market).

If $\beta_j > 1$ is considered to be aggressive (more risk and return than market portfolio)

If $\beta_j < 1$ is considered to be defensive (less risk and return than market portfolio)

If $\beta_j = 1$ is considered to be indifferent (risk and return equal to market portfolio)e known,

$$\beta_j = \frac{Cov_{jM}}{\sigma_M^2}$$

Substitute the value $\beta_j = \beta_m$

$$\beta_M = \frac{COV_{MM}}{\sigma_M^2} = \frac{r_{MM} \cdot \sigma_M \cdot \sigma_M}{\sigma_M \cdot \sigma_M} = r_{MM} = 1$$

Note : The correlation of the rate of return on the market portfolio with itself must be positive and perfect i.e. $r_{MM} = 1$

The portfolio beta is weighted average beta of individual assets of the portfolio. The weight being the percentage of portfolio value is invested each asset. The portfolio beta can be calculated by the following equation.

$$\beta_P = W_A \times \beta_A + W_B + \beta_B + ... + W_n \times \beta_n$$

Illustration 10

You are given the following sets of historical returns of stock A and Nepal Stock Exchange (NEPSE)

Period	1	2	3	4	5
Return of Stock A	-14%	23	17.5	2	8.1
Return of NEPSE	-26.5%	37.2	23.8	7.2	6.6

Determine the stock A's beta coefficient.

Solution.

Calculation of beta coefficient

Year	R_A	$R_A - \bar{R}_A$	$(R_A - \bar{R}_A)^2$	R_M	$R_M - \bar{R}_M$	$(R_M - \bar{R}_M)^2$	$(R_A - \bar{R}_A)(R_M - \bar{R}_M)$
1	-14%			-26.5%			
2	23			37.2			
3	17.5			23.8			
4	2			7.2			
5	8.1			6.6			
		$\Sigma (R_A - \bar{R}_A)^2 =$			$\Sigma (R_M - \bar{R}_M)^2 =$		$\Sigma (R_A - \bar{R}_A)(R_M - \bar{R}_M) =$

$$s_M = \sqrt{\frac{\sum (R_M - \bar{R}_M)^2}{n-1}}$$

$$COV_{AM} = \frac{\sum (R_A - \bar{R}_A)(R_M - \bar{R}_M)}{n-1} =$$

$$\beta_A = \frac{Cov_{AM}}{\sigma_M^2}$$

Capital assets pricing Model (CAPM)

The CAPM was developed by William F. Sharpe in 1964. He was received the noble price in economics. The CAPM specifies the relationship between risk and required rate of return on assets when they are held in well diversified portfolio. According to CAPM, any asset's required rate of return is equal to risk free rate or return plus risk premium proportional to systematic risk measured by beta. The model can be express in equitation form as below:

$$E(R_j) = Rf + [\bar{R}_M - Rf]\,\beta_j$$

$$E(R_j) = Rf + [E(R_M) - Rf]\,\beta_j$$

Required rate of return $E(R_j)$ of an asset is the rate that an investor expects to earn to compensate the risk borne by investor on investing on the assets. In other words, it is the minimum rate of return an investor considers acceptable on assets.

Risk-free rate (Rf) is the rate of interest that is earned default-free assets (or zero risk assets). The rate of interest on Treasury securities are considered as risk free rates.

Return on market $E(R_M)$ is the return on all assets available in the market or market index portfolio or NEPSE index.

Beta (β_j) is the coefficient determined by regressing the return of assets j on the return of the market index.

The last term $[E(R_M) - Rf]\beta_j$ is known as security's risk premium which is equal to beta times the market risk premium. The ***market risk premium*** is defined as the difference between return on market portfolio and risk free rate i.e $E(R_M) - Rf$.

Assumptions of CAPM

Some assumptions of the CAPM are as under.

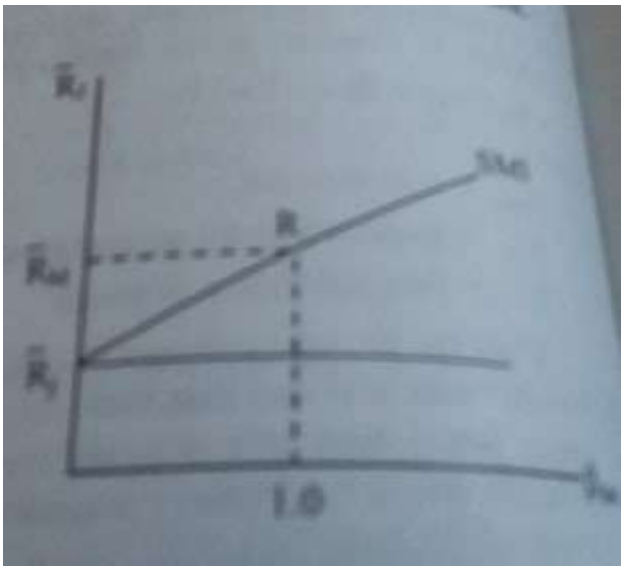
i. The a model assume that all investors are risk averse
ii. It is assumed that investors have no constraints on borrowing and lending
iii. All investors have homogenous expectations
iv. All investors have common investment horizon
v. All investments are infinitely divisible and marketable

vi. The capital markets are in a state of equilibrium or striving towards equilibrium.

Security Market Line (SML)

The algebraic equitation is known as CAPM and it calculates the required rate of return is also represented by graph, which is known as security market line. SML shows the relationship between risks measured beta and the required rate of return for individual securities. The beta coefficient increases, the required rate of return also increases. The slope of SML is:

Slope of SML = $E(R_M) – Rf)/ \beta_M$

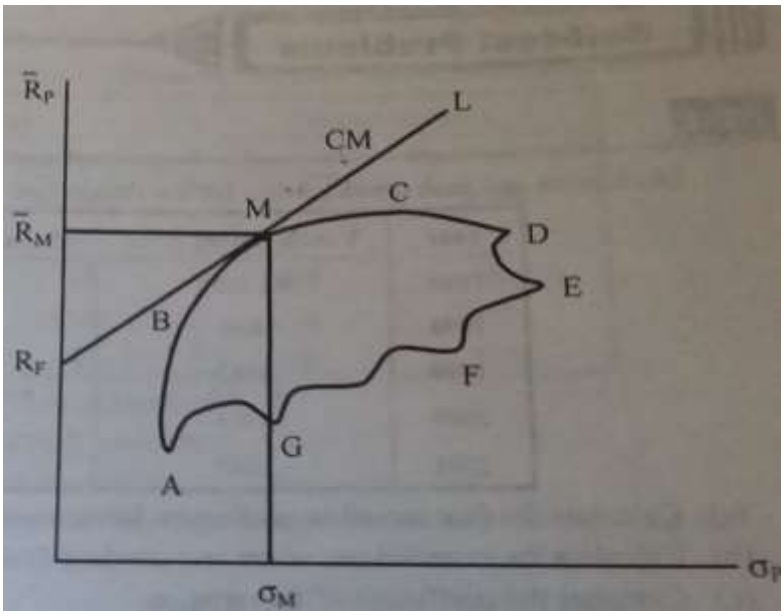


The figure shows the linear relationship between beta and required rate or return of particular assets. As shown in above figure, any assets having beta equal to 1 will have the required rate of return equal to the market portfolio. The asset having beta to less than 1 will have required rate of return less than the market portfolio return and vice-versa.

Capital Market Line(CML)

When we introduce a risk free asset into Markowitz portfolio, the efficient frontier is change from a curve to a straight line. The new efficient frontier is called a capital market line.

Slope of SML = $E(R_M) – Rf)/ \sigma_M$



PRACTICE PROBLEMS

Short Problems (SP)

SP-1

Rate of return; Suppose a stock had an initial price of Rs 62 per share, paid a dividend of Rs 1.50 per share during the year, and had an ending price of Rs 51. Compute the percentage total return.

SP-2

Dividend yield and capital gain yield; In problem 1 what was the dividend yield ? The capital gain yield ?

SP-3

Average return; You have observed the following returns on BC Computer's stock over the past five years; –8 percent, 13 percent, 5 percent, 16 percent and 32 percent. What was the average return on BC's stock over the five year period ?

SP-4

Weighted of portfolio; What are the portfolio weights for portfolio that has 90 shares of stock A that sell for Rs 35 per share and 70 shares of stock B that sells for Rs 25 per share ?

SP-5

Expected return on portfolio; You own a portfolio that has Rs 700 invested in stock A and Rs 2400 invested in stock B. If the expected return on these stocks are 11 percent and 18 percent, respectively, what is the expected return on the portfolio ?

SP-6

Expected return on portfolio; You own a portfolio that is 50 percent invested in stock X, 30 percent in stock Y and 20 percent in stock Z. The expected return on these stocks are 10 percent, 18 percent, and 13 percent, respectively. What is the expected return an portfolio ?

SP-7

Correlation coefficient; Covariance between stock A and B is 120 and their standard deviation is 10 percent and 12 percent. What is its correlation coefficient ?

SP-8

Variance; If standard deviation of the return of security is 5 percent what is its variance ?

SP-9

Portfolio beta; You own a stock portfolio invested 25 percent in stock Q, 20 percent in stock R, 15 percent in stock S and 40 percent in stock T. The betas for these four stock are 0.9, 1.4, 1.1 and 1.8 respectively. What is the portfolio beta ?

SP-10

Expected return on stock; A stock has beta of 1.5, the expected return on market is 14 percent and risk free rate is 5 percent. What must expected return on this stock be ?

SP-11

Beta; A stock has expected return of 13 percent, the risk free rate is 5 percent and market risk premium is 7 percent. What must the beta of this stock be ?

SP-12

Expected return on market; A stock has an expected return of 10 percent, its beta is 0.9 and risk free rate is 6 percent. What must the expected return on market be ?

SP-13

Risk free rate; A stock has expected return of 14 percent, a beta of 1.6 and expected return on market is 11 percent, what must the risk free rate be ?

SP-14

Required rate of return; Stock Y has a beta of 1.45 and expected return of 17 percent. If the risk free rate is 6 percent and market risk premium is 7.5 percent, is the stock correctly priced ?

Long Problems (LP)

LP-1 (WBB-5.4)

Expected returns; The market and Stock J have the following probability distributions:

Probability	K_M	K_J
0.3	15%	20%
0.4	9	5
0.3	18	12

(a) Calculate the expected rates of return for the market and Stock J.
(b) Calculate the standard deviations for the market and Stock J.
(c) Calculate the coefficients of variation for the market and Stock J.

LP-2 (BH-5.6)

Expected returns; Stocks X and Y have the following probability distributions of expected future returns:

Probability	X	Y
0.1	(10)%	(35)%
0.2	2	0
0.4	12	20
0.2	20	25
0.1	38	45

(a) Calculate the expected rate of return for Stock Y ($\hat{K}_X = 12\%$).
(b) Calculate the standard deviation of expected returns for Stock X ($\sigma_Y = 20.35\%$). Now calculate the coefficient of variation for Stock Y. Is it possible that most investors might regard Stock Y as being less risky than Stock X? Explain.

LP-3

Expected returns, standard deviation and coefficient of variation; The Birat Company has a new investment project. The project returns are estimated as follows:

Year	Project return (K_i)
2010	10%
2011	17
2012	24
2013	20
2014	14

Calculate:

(a) The expected return on the investment.

(b) The variance of return

(c) The standard deviation of return

(d) The coefficient of variation of return of the Barfield Company.

LP-4

Expected return and Standard deviation; NCC Bank's stock and Nabil Bank's Stock have the following probability distributions of expected future returns:

Probability	**0.1**	**0.2**	**0.4**	**0.2**	**0.1**
Return (NCC)	–12.5%	5%	10%	25%	35%
Return (Nabil)	–20%	0%	15%	30%	36%

(a) Calculate the expected rate of return for each bank's stock.

(b) Calculate the standard deviation of expected returns for each bank's stock.

(c) In which stock you prefer to invest and why?

LP-5

Expected return, Standard deviation and Coefficient of variation; Stock A and B have the following probability distribution of expected future returns :

State of economy	**Probability**	**Stock A**	**Stock B**
Recession	0.3	–5%	–5%
Average	0.4	15	10
Boom	0.3	35	25

(a) Which stock is more profitable ?

(b) Which stock is more risker in absolute term ?

(c) Which stock is more risker in relative term ?

(d) Which stock would you prefer ?

LP-6 (BH-5.19)

Expected returns; Suppose you won the Pokhara lottery and were offered (1) Rs.0.5 million or (2) a gamble in which you would get Rs.1 million if a head were flipped but zero if a tail came up.

(a) What is the expected value of the gamble?
(b) Would you take the sure Rs.0.5 million or the gamble?
(c) If you choose the sure Rs.0.5 million, are you a risk averter or a risk seeker?

Solution:

(a) Calculation of expected value of the Gamble.

Expected value = $P_S \times K$

P_S	Outcomes (K)	$P_S \times K$
0.50	Rs.10,00,000	Rs.500,000
0.50	0	0
	Expected value	= Rs.500,000

Therefore, the expected value of the Gamble is Rs.500,000.

(b) I would take sure Rs. 0.5 million because the expected value in both is equal but the Gamble is riskness then sure.

(c) If I choose the sure Rs.0.5 million, I am a risk averter not a risk seeker.

LP-7

Covariance and correlation coefficient; The Mc Himal has developed the following data regarding a project to add new production facilities.

State	Probability	Market return	Project return
1	0.05	-20	–30
2	0.25	10	5
3	0.35	15	20
4	0.20	20	25
5	0.15	25	30

Calculate:

(a) Expected return on the project and market.
(b) The variance of the project and market returns.
(c) The standard deviation of project and market returns,
(d) The coefficient of variation of project and market returns.
(e) The covariance of the project returns with the market returns.
(f) The correlation coefficient between project returns and market returns.

LP-8

Consider the Probability distribution of alternative rates of return associated with stock A and B given in the following.

State of economy	Probability	Stock A	Stock B
1	0.3	10%	-10%
2	0.4	15	20

3	0.3	20	30

(a) Calculate the expected return and standard deviation of stock A and stock B.

(b) What are the covariance and correlation coefficient between stock A and stock B?

(c) If you form a portfolio of stock A and stock B comprising 70 percent wealth in stock A and the rest in stock B, calculate the risk and return of your portfolio.

(d) Which investment would you prefer? Stock A or Stock B or the portfolio?

(ans. a.14.5%,4.15% &11%,17.58% b.70.50,0.966 c.13.45,8.12%)

LP-9

You have observed the following returns over the past five year of stock B and N.

Year	Stock B	Stock N
2015	12%	14%
2016	18	9
2017	14	-7
2018	6	-4
2019	20	-10

Required:

a) Calculate the average returns and standard deviation of each stock.

b) Calculate the coefficient of variation of each stock.

c) Calculate the covariance and correlation between stock B and N.

d) Calculate the average rate of return for the portfolio if equal amount of money is invested in each stock. Also calculate the portfolio standard deviation.

LP-10

Consider the Probability distribution of alternative rates of return associated with stock A and B given in the following.

State of economy	Probability	Stock A	Stock B
1	0.3	15%	-5%
2	0.4	10%	15%
3	0.3	5	35

a) Calculate the expected return and standard deviation of stock A and stock B.

b) Which stock would you prefer? Why?

c) What are the covariance and correlation coefficient between stock A and stock B?

d) Would you think that forming a portfolio of these two stocks reduces the risk? Why or why not? Explain.

e) If you form a portfolio of stock A and stock B comprising 70 percent wealth in stock A and the rest in stock B, calculate the risk and return of your portfolio. Are you able to diversify the risk forming the portfolio?

f) Covariance between stock B and market is 140 and standard deviation of market is 9 percent. If risk free rate is 6 percent and market risk premium is also 4 percent, calculate required rate of return on stock B. is stock B overpriced or underpriced?

LP-11 (VH-7)

Portfolio expected return; Sita Sharma invests the following sums of money in common stocks having expected returns as follows:

Security	Amount Invested	Expected Return
Everest Bank	Rs.6000	14%
Himalayan Bank	11000	16
Investment Bank	9000	17
Bank of Kathmandu	7000	13
Citizen Bank	5000	20
Prabhu bank	13000	15
NIC Asia bank	9000	18

(a) What is the expected return (percentage) on her portfolio?

(b) What would be her expected return if she quadrupled her investment in Citizen Bank while leaving everything else the same?

LP-12

Portfolio expected return and Risk; The rate of return on two stock X and Y along with their probabilities are given below :

State of economy	Probabilities	Rate of return %	
		X	Y
1	0.10	–10	–20
2	0.20	5	–5
3	0.40	10	15
4	0.20	15	30
5	0.10	20	30

(a) Calculate the expected return and standard deviation of stock X and Y.

(b) What are the covariance and correlation coefficients between X and Y.

(c) What are the expected return and risk (standard deviation) of a portfolio contain stock X and Y with 30 percentage of wealth invested in stock X and rest in stock Y ?

(d) What is the expected risk (Standard deviation) of this portfolio if the correlation coefficient for the two stocks have;

(i) A perfect positive correlation

(ii) A perfect negative correlation

LP-13 (BH-5.21)

Realized rates of return; Stocks A and B have the following historical returns:

Year	Stock A's Returns, k_A	Stock B's Returns, k_B
2010	(18.00)%	(14.50)%
2011	33.00	21.80
2012	15.00	30.50
2013	(0.50)	(7.60)
2014	27.00	26.30

(f) Calculate the average rate of return for each stock during the period 2010 through 2014.

(g) Assume that someone held a portfolio consisting of 50 percent of stock A and 50 percent of Stock B. What would have been the realized rate of return on the portfolio in each year from 2010 through 2014? What would have been the average return on the portfolio during this period?

(h) Calculate the standard deviation of returns for each stock and for the portfolio.

(i) Calculate the coefficient of variation for each stock and for the portfolio.

(j) If you were a risk-averse investor, would you prefer to hold Stock A, Stock B, or the portfolio? Why?

LP-14

Portfolio average return and risk; Consider the following historical rate of return for Asset A and Asset B:

Year	Asset A returns	Asset B returns
2005	16%	12%
2006	5	(2)
2007	5	10
2008	6	6
2009	(4)	11
2010	6	3
2011	0	(1)
2012	3	16
2013	(2)	14
2014	11	16

Using historical returns for asset A and asset B, calculate each asset's

(a) (i) mean return, (ii) variance, (iii), standard deviation, (iv) the covariance of asset A and B, and (v) the correlation coefficient between A and B.

(b) Suppose that asset A and B are combined in equal proportions, to form a portfolio (that is, 50 percent of the portfolio value is invested in Asset A, and 50 percent in asset B). Calculate the expected return and risk of the portfolio.

(c) What is the expected return and risk if all wealth were invested in Assets A ?

(d) What is the expected return and risk if all wealth invested in Assets B ?

LP-15

Portfolio expected return and risk; The probability distribution and expected return on Stock M and Stock N are provided below:

State of economy	Probability	Return on stock	
		Stock M	Stock N
1	0.15	–10%	15%
2	0.20	5	10
3	0.30	10	5
4	0.35	20	0

Assuming that investors have Rs.2,000,000 to invest in total Rs. 1,500,000 in Stock M and Rs.500,000 in Stock N. (i) Calculate expected return on each stock, variance of each stock and standard deviation of each stock. (ii) Calculate portfolio return, variance of the portfolio, covariance of portfolio and standard deviation of portfolio.

LP-16

Portfolio expected return and risk; There are two assets and three states of economy with following probabilities and rate of return on stock R and stock S.

State of economy	Probability of state of economy	Rate of return on stock	
		R	S
Recession	0.20	–15%	20%
Normal	0.50	20	30
Boom	0.30	60	40

(a) Find out the expected return on each stock.

(b) Find out standard deviation on each stock.

(c) Find out expected return and standard deviation on portfolio if you put Rs.15000 in stock R and Rs.5000 in stock S given total investment of Rs.20000.

LP-17

You are planning to invest Rs. 200000 in a portfolio of securities. Two securities, A and B are available with the following estimates of probability distribution of return

Security A		Security B	
P_A	R_A	P_B	R_B
0.1	-10%	0.1	-30
0.2	5	0.2	0
0.4	15	0.4	20
0.2	25	0.2	40
0.1	40	0.1	70
	R_A=?		R_B=20%
	σ_A=?		σ_B=25.7%

a) The expected return for security B is R_B = 20 percent, and the standard deviation is σ_B=25.7 percent. Find R_A and σ_A.
b) Find the value of weight of A, W_A that produces minimum risk of the portfolio. Assume the correlation between A and B, ρ_{AB}= -0.5.
c) Determine the expected return and standard deviation of minimum variance portfolio?

LP-18

You are given the following sets of historical returns of stock A and Nepal Stock Exchange (NEPSE)

Period	1	2	3	4	5
Return of Stock A	-14%	23	17.5	2	8.1
Return of NEPSE	-26.5%	37.2	23.8	7.2	6.6

Required.

a) Determine the stock A's beta coefficient.
b) Explain the volatility of stock return with respect to market return as explain by beta.

LP-19 (WBB-5.6)

Required rate of return; Suppose K_{RF} = 8%, K_M = 11%, and K_B = 14%.

(a) Calculate Stock B's beta.
(b) If Stock B's beta were 1.5, what would be B's new required rate of return?

LP-20 (BH-5.7)

Required rate of return; Suppose K_{RF} = 9%, K_M = 14%, and β_J = 1.3

(a) What is K_j the required rate of return on stock J?
(b) Now suppose K_{RF} (1) increases to 10 percent or (2) decreases to 8 percent. The slope of the SML remains constant. How would this affect K_M and K_j?

(c) Now assume K_{RF} remains at 9 percent but K_M (1) increases to 16 percent or (2) falls to 13 percent. The slope of the SML does not remain constant. How would these changes affect K_j?

LP-21 (BH-5.9)

Portfolio required return; Suppose you are the money manager of a Rs.4 million investment fund. The fund consists of 4 stocks with the following investments and betas:

Stock	Investment	Beta
A	Rs.400,000	1.50
B	600,000	(0.50)
C	1,000,000	1.25
D	2,000,000	0.75

If the market required rate of return is 14 percent and the risk-free rate is 6 percent. What is the fund's required rate of return?

LP-22 (BH-5.10)

Required rate of return; Stock R has a beta of 1.5. Stock S has a beta of 0.75, the expected rate of return on an average stock is 15 percent, and the risk-free rate of return is 9 percent. By how much does the required return on the riskier stock exceed the required return on the less risky stock?

LP-23 (BH-5.8)

Portfolio beta; Suppose you hold a diversified portfolio consisting of a Rs.7,500 investment in each of 20 different common stocks. The portfolio beta is equal to 1.12. Now suppose you have decided to sell one of the stocks in your portfolio with a beta equal to 1.0 for Rs.7,500 and to use these proceeds to buy another stock for your portfolio. Assume the new stock's beta is equal to 1.75. Calculate your portfolio's new beta.

LP-24 (BH-5.20)

Security Market Line; The Mr Johan Shrestha Investment Fund has total capital of Rs.500 million invested in five stocks:

Stock	Investment	Stock's Beta Coefficient
A	Rs.160 million	0.5
B	120 million	2.0
C	80 million	4.0
D	80 million	1.0
E	60 million	3.0

The current risk-free rate is 8 percent, whereas market returns have the following estimated probability distribution for the next period:

Probability	Market Return
0.1	10%
0.2	12
0.4	13
0.2	16
0.1	17

(a) Compute the expected return for the market.
(b) Compute the beta coefficient for the investment fund. (Remember, this a portfolio.)
(c) What is the estimated equation for the security Market Line (SML)?
(d) Compute the fund's required rate of return for the next period.

LP-25 (VH-6)

Required rate of return; At present, suppose the risk-free rate is 10 percent and the expected return on the market portfolio is 15 percent. The expected returns for four stocks are listed together with their expected betas.

Stock	Expected Return	Expected Beta
Himalaya Corporation	17.0%	1.3
Asian Paint Company	14.5	0.8
National Auto Mobile Company	15.5	1.1
Palpa Electronics, Inc.	18.0	1.7

(a) On the basis of these expectations, which stocks are overvalued? Which are undervalued?
(b) If the risk free rate to rise to 12 percent and the expected return on the market portfolio to 16 percent, which would be undervalued? (Assume the expected returns and the betas stay the same.)

LP-26 (BH-ST-3)

Beta and required rate of return; Karnali Corporation is a holding company with four main subsidiaries. The percentage of in business coming from each of the subsidiaries, and their respective betas, are as follows:

Subsidiary	Percentage of Business	Beta
Electric utility	60%	0.70
Cable company	25	0.90

Real estate	10	1.30
International/special projects	5	1.50

(a) What is the holding company's beta?
(b) Assume that the risk-free rate is 6 percent and the market risk premium is 5 percent. What is the holding company's required rate of return?

LP-27

Stock X and Y have the following probability distribution of expected future returns:

Probability	0.1	0.2	0.3	0.3	0.1
Return on X (%)	(10)	2	12	20	38
Return on Y(%)	(35)	0	20	25	45

(a) Calculate the expected rate of return for stock X. (Given expected rate of return for Y is 14.5%)
(b) Calculate the standard deviation of expected rate of return for Y. Given variance of X is 154.56)
(c) Is it possible that most investors might regard stock Y as being more risky than stock X? Explain.

Answer Sheet

Short problems

1. –15.32% **2.** 2.42%; –17.74% **4.** 11.60% **5.** 0.64; 0.36 **6.** 16.42% **7.** 13%

8. 1 **9.** 25% **10.** 1.39 **11.** 18.5% **12.** 1.14 **13.** 10.44% **14.** 6% **15.** 16.875 (not correctly priced)

Long problems

1. (a) $k_M = 13.5\%$; $k_J = 11.6\%$ (b) $\sigma_M = 3.85\%$; $\sigma_J = 6.22\%$

(c) $CV_M = 0.29$; $CV_J = 0.54$.

2. (a) $k_Y = 14\%$ (b) $\sigma_X = 12.20\%$

(c) $CV_X = 1.02$, $CV_Y = 1.45$, (No. it is not possible that must investor might regard stock Y as being risky than stock X because according to above calculation $CV_X < CV_Y$ i.e. The co-efficient of variation of stock are greater than that stock X.)

3. $K_j = 0.17$ or 17%, $\sigma^2_j = 0.0029$ or 29%, $\sigma_j = 0.00539$, 5.39%, $CV_j = 0.317$

4. (a) $K_{NC} = 12.25\%$, $K_{NA} = 13.6\%$ (b) $\sigma_{NC} = 12.57\%$, $\sigma_{NA} = 15.96\%$ (c) $CV_{NC} = 1.026$, $CV_{NA} = 1.174$ (I would preferred to invest of NCC bank's stock because CV of NCC Bank is lower than CV of Nabil Bank.

5. (a) $K_A = 15\%$, $K_B = 10\%$ (Stock A) (b) $\sigma_A = 15.49\%$ $\sigma_B = 11.62\%$ (Stock A) (c) $CV_A = 1.03$, ($CV_B = 1.16$ (Stock B) (d) Stock A

7. (a) $K_j = 0.1625$ or 16.25%, $K_m = 0.1450$ or 14.50% (b) $\sigma_j^2 = 0.1872$ or 187.2% $\sigma^2_m = 0.0087$ or 87% (c) $\sigma_j = 0.1368$ or 13.68%, $\sigma_m = 0.0933$ or 9.33% (d) $CV_j = 0.84$, $CV_m = 0.643$ (e) $COV_{jm} = 0.0126$ (f) $r_{jm} = 0.9871$

11. (a) 16.014% (b) 16.82%

12. (a) $K_x = 9\%$ $K_y = 12\%$, $\sigma_x = 7.68\%$, $\sigma_y = 16.16\%$ (b) $COV_{xy} = 117$, $\gamma_{xy} = 0.9427$ (c) $K_P = 11.1\%$, $\sigma_p = 13.50\%$ (d) (i) 13.61% (ii) 9%

13. (a) $K_A = 11.30\%$, $K_B = 11.30\%$

    (b) 1991 = –16.25%, 1992 = 27.4%, 1993 = 22.75%, 1994 = –4.05%, 1995 = 26.65%, $K_p = 11.3\%$

    (c) $\sigma_A = 20.8\%$; $\sigma_B = 20.8\%$; $\sigma_P = 20.1\%$

    (d) $CV_A = 1.84$, $CV_B = 1.84$, $CV_P = 1.78$

    (e) If I am a risk averse investor, I would prefer to hold the portfolio because the standard deviation and coefficient of variation for the portfolio is the lessess (i.e. $\sigma_p < \sigma_B$, σ_A and $CV_P < CV_A < CV_A$)

14. (a) (i) 4.60%, 8.50% (ii) 35.16, 44.50 (iii) 5.93%, 6.68% (iv) 5.22 (v) 0.132 (b) 6.55%, 4.75%

    (c) 4.60%, 5.93% (d) 8.50%, 6.68%

15. (i) $K_m = 9.5\%$, $K_N = 5.75\%$, $\sigma^2_m = 99.75$, $\sigma^2_N = 28.1876$, $\sigma_m = 9.987\%$, $\sigma_N = 5.31\%$

    (ii) $COV_{MN} = –52.125$, $K_p = 8.5625\%$, $\sigma^2_p = 38.3242\%$, $\sigma_p = 6.19\%$

16. (a) $K_R = 25\%$, $K_S = 31\%$ (b) $\sigma_R = 26.46\%$, $\sigma_S = 7\%$ (c) $K_P = 26.5\%$, $\sigma_P = 21.59\%$, $COV_{RS} = 185$

19. (a) $\beta_B = 2$ (b) $k_B = 12.5\%$

20. (a) $k_J = 15.5\%$ (b) (i) $k_J = 16.5\%$ (ii) $K_J = 14.5\%$

    (c) (i) $k_J = 18.1\%$ (ii) $K_J = 14.2\%$ Note: According to the capital asset pricing model (CAPM) the increase in K_{RF} also cause an equal increase in market return. i.e. in this case RF increase by 1% as result $K_m = 15\%$ (i.e. 14% + 1%) $\therefore$ This increase in FR would be increase K_m and K_j

21. $\beta_P = 0.7625$; $k_P = 12.1\%$

22. 4.5% (As we know that the stock R is riskier than the stock S because stock R's beta is higher than S's beta. Therefore rate of return on the stock R exceeds the required rate of return on the stock S by 4.5% (i.e. 18% – 13.5%)

23. $\beta_{New} = 1.16$

24. (a) 13.5% (b) 1.8 (c) $k_F = 8\% + 5.5\% \beta_J$ (d) 17.9% (e) The new stock should not be purchased because its required rate of return is greater than expected rate of return (i.e. 19% and 18%) Johan Shrestha would be indifferent purchasing the stock at 19% expected return because the expected rate of return is equal to required rate of return.

25. (a) 16.5%, 14%, 15.5%, and 18.5% (stock Palpa Electronic Inc., is over valued) (b) 17.2%, 15.2%, 16.4%, and 18.8% (all stocks are overvalued)

26. (a) 0.85; (b) 10.25%

Chapter 3 and 4

Basics of Capital budgeting

or

Cash flow estimation

Meaning of capital budgeting

- Capital budgeting is the process of acquiring the fixed assets or process of investment in capital projects.
- The process of capital budgeting includes the identification of the investment opportunity, estimation of relevant costs and benefits of the identified projects, evaluation of the projects, approval and monitoring of the projects.

Cond....

- The planning for capital expenditure is know as capital budgeting.
- It is a decision making process for an investment on long term project.
- Capital budgeting is the process of investment, evaluating, planning and financing major investment project of an organization
- The capital budgeting decision means a decision as to whether or not money should invested in long-term projects

Features of Capital Budgeting

- The exchange of current funds for future benefits.
- The funds are invested in long term activities
- The future benefits will occur to the firm over a series of years.
- Capital budgeting requires large amount of funds (resources)
- Capital budgeting decisions are not reversible.

Classification of projects

1.Project expansion

A company adds capacity to its existing product lines to expand existing operations is called project expansion. Expansion of new business requires invested in new product and new kind of production activity with in the firm

2. Replacement project

Assets become outdated and obsolete with technological changes. The firm must decide to replace those assets with new assets that operate more economically is call replacement decision

3. **New project**

New project may be related with the establishment of a new business like selection of new location, building, plant, arranging furniture's and so on.

Cond....

4. Independent project

Independent projects serve different purposes and do not compete with each other. The firm may select all the projects if all are profitable. But if all projects are not profitable then all projects are rejected.

5. Mutually exclusive project

Mutually exclusives projects serve the same purpose or same task and compete with each other. If one investment is under taken, others will have to be excluded.

5. Diversification

Expansion having with different variety of product or business is known as diversification. Each business firm wants to earn more. For this, firm may add different product line to cover larger market and minimizing risk is called diversification project.

Techniques of capital budgeting

1. Traditional or non-discounting cash flow method
   a) Payback period (PBP)
   b) Accounting rate of return (ARR)
2. Time-adjusted or discounting cash flow method
   a) Discounted payback period (DPBP)
   b) Net present value (NPV)
   c) Profitability index (PI)
   d) Internal rate of return (IRR)
   e) Modified internal rate of return (MIRR)

Basics Capital Structure Decision

Financial structure and capital structure

A firm's total assets are financed from *equity* and *debt*. Equity capital is owners' money and consists of stock, paid in capital and retained earnings. Debt capital is borrowed money and can be classified as short term debt and long term debt. Thus, liabilities and equity section of balance sheet is composed of short term debt, long term debt and equity. The composition of short term debt, long term debt and equity is called *financial structure*.

The term *capital structure* is used to refer to the mix of long term sources of capital. The long term debt and equity capital are the long term sources of capital. In other words, capital structure is the composition of long term source of financing. A general rule of capital structure, the use of higher debt financing maximizes the earnings per share of stockholders because the cost of debt financing is relatively cheaper and limited. However, it also increases the financial risk. Therefore, capital structure can affect the value of the firm and cost of capital. As a result, the financial manager should attempt to maintain *optimal capital structure* that maximizes the value of the firm and minimizes the cost of capital. Business risk, tax rate, interest rate, manager attitudes, financial flexibility, stability of sales etc. are the main factors that affecting the optimal capital structure.

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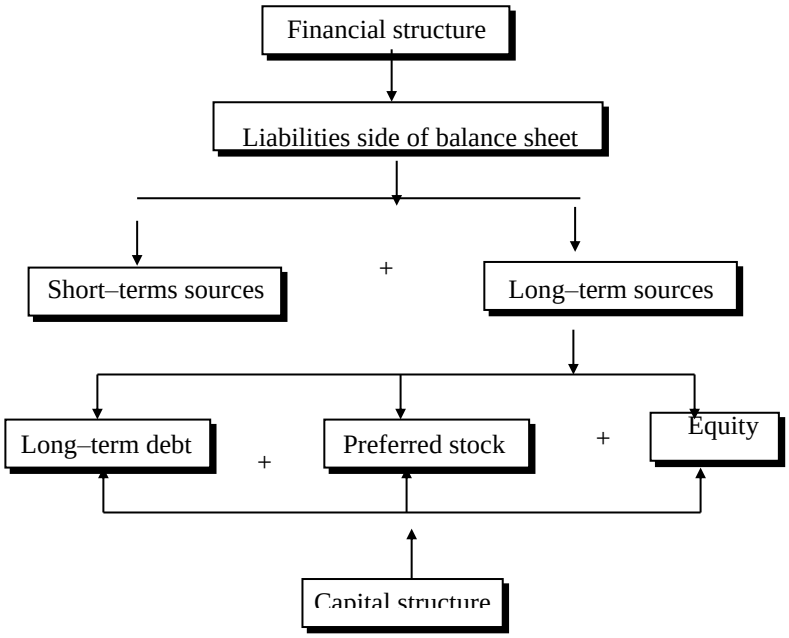


Capital structure = Financial structure – Current liabilities (Short term debt)

Business Risk

Risk is variability in return. Return on investment varies due to the number of factors such as in demand of the product and cost of inputs, economic condition, market competition and so on. These are the inherent attributes in the operation of the business and cause the variation between realized return and expected return on investment over the years. Business risk is the variation in the return due to the inherent attributes of operation of a firm. So, this is called operating risk.

Business risk is defined as uncertainty inherent in projection of future return on assets (ROA) or return on equity (ROE) if the firm uses no debt. Business risk refers to the uncertainly about the operating income (EBIT) by the nature of the business. Business risk depend a number of factors the more important of which are the following:

a) Demand Variability
b) Sales price variability
c) Inputs cost variability
d) Ability to develop new products in a timely, cost effective manner
e) Ability to adjust output prices for charges in input cost

Financial Risk

Financial risk is the additional risk placed on the common stockholders as a result of using financial leverage, which results when a firm uses fixed income securities (i.e. debt and preferred stock) to raise capital. Financial risk is associated with the creation of fixed obligation to the firm by using debt element in the capital structure. Financial risk is introduced by the use of financial leverage.

Companies that issue more debt instruments would have higher financial risk than companies financed mostly or entirely by equity. Financial risk can be measured by ratios such as the firm's financial leverage multiplier, total debt to assets ratio or degree of financial leverage.

Operating Leverage

The term 'Leverage' is derived from physics, it refers to the use of a lever to raise a heavy object with relatively small forces. In finance, operating leverage refers to the potential use of fixed operating costs. It shows the responsiveness of changes in operating profit to the change in sales. A given change in sales may bring more proportionate change in EBIT. In other words, operating leverage can be defined as the use of fixed operating costs in a firm's operation that result into more than proportional changes into firm's EBIT foe a given changes in sales.

Degree of operating leverage (DOL) provides a numerical measure of firm's operating leverage. It is the quantitative measure of the responsiveness of change in firm's to change in sales.

$$\text{Degree of operating leverage} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}}$$

or, $$DOL = \frac{CM}{EBIT}$$ or, $$DOL = \frac{Q\,(S - V)}{Q\,(S - V) - F}$$

Illustration 4.

Given the following information:

Selling price per units (S)	= Rs. 100
Variable cost per unit (V)	= Rs. 50
Fixed cost (FC)	= Rs. 50,000
Production and sales units (Q)	= 2000 units.

Required:

(a) Calculate degree of operating leverage.
(b) Calculate the percentage change in EBIT if sales increase by 20%.

Solution :

(a) Degree of operating leverage (DOL)

Sales (2000 × Rs. 100)	Rs. 200,000
less: variable cost (2000 × Rs. 50)	100,000
Contribution margin	100,000
less: fixed cost	50,000
EBIT	Rs. 50,000

We have,

$$\text{DOL} = \frac{\text{CM}}{\text{EBIT}} = \frac{\text{R } 100000}{\text{Rs } 50000} == 2 \text{ times}$$

$$\text{DOL} = \frac{\text{Q(S – V)}}{\text{Q(S – V) – FC}} = \frac{\text{2000 (Rs. 100 – Rs. 50)}}{\text{2000 (Rs. 100 – Rs. 50 – Rs. 50000)}} = 2 \text{ times}$$

(b) The DOL 2 times which indicates that a 1% increase/decrease in sales will result 2% increase/decrease in operating income (EBIT). Here, DOL is 2 and percentage increase in sales is 20% then percentage in EBIT is 40%

Percentage changes in EBIT = DOL × % change in sales = 2 × 20% = 40%

New EBIT = old EBIT (1 + % change in EBIT)

= Rs. 50,000 (1 + 0.40) = Rs. 70,000

or, New EBIT = Rs. 50,000 + 40% of Rs. 50,000 = Rs. 70,000

Verification

	Existing	**New**
Level of sales unit (Q)	2000	2400
Sales revenue	Rs. 200000	Rs. 240000
Less; variable cost	100,000	120000
CM	100,000	120,000
Less : fixed cost	50,000	50,000
EBIT	Rs. 50000	Rs. 70000
% change in EBIT	–	40%

$$\text{DOL} = \frac{\text{10\% change in EBIT}}{\text{\% change in sales}} = \frac{40\%}{20\%} = 2 \text{ tims.}$$

Financial Leverage

Financial leverage explains how a given change in operating income of a firm affects its earnings per share and earnings to common stockholders. It is the responsiveness of change in firm's EPS to change in EBIT. Financial leverage exists because of the use of fixed charge bearing securities, such as, bond and preferred stock. One measure of financial leverage is to debt to assets ratio. Higher debt ratio indicates higher financial leverage. The financial manager should know how and to what extent the use of fixed charge bearing securities influence the earning and risk.

The degree of financial leverage (DFL) is a quantitative measure of the sensitivity of a firm's earnings per share to a change in the firm's operating profit (EBIT). It is a numerical measure of responsiveness of change in EPS or EBT to the change in EBIT.

$$\text{Degree of financial leverage (DFL)} = \frac{\text{\% Change in EPS}}{\text{\% Change in EBIT}}$$

$$\text{DFL} = \frac{\text{Sales – Variable cost – Fixed cost}}{\text{Sales – Variable cost – Fixed cost – Interest}} = \frac{\text{EBIT}}{\text{EBIT – Interest}} = \frac{\text{EBIT}}{\text{EBT}}$$

$$DFL = \frac{Q\,(S - V) - FC}{Q(S - V) - FC - I}$$

If preferred stock dividend is given,

$$DFL = \frac{EBIT}{EBIT - I - \frac{Pd}{(1 - T)}}$$

DFL of 2 (suppose) indicate that if there is 1 percentage change in EBIT it will cause 2 percent change in net income or earning available to shareholder (EPS).

% change in EPS = DFL × % change in EBIT

$EPS_{new} = EPS_{old}$ (1 + DFL × % change in EBIT)

Illustration 5.

Given the following information,

Selling price per unit (S)	Rs.5
Variable cost (% of selling price)	75%
Fixed operating cost	Rs.50,000
Interest expenses	Rs.10,000
Preferred stock dividend	Rs.0
Marginal tax rate	40%
Number of common shares	20,000
Production and sales unit (Q)	60,000 units

Required :

(a) Income statement

(b) Degree financial leverage (DFL)

(c) If actual EBIT increased to Rs 30,000, calculate the new EPS based on DFL

(d) DFL if preferred stock divided is Rs 1000

Solution :

(a) Income statement

Sales (60,000 × Rs 5)	Rs 300,000
Less : Variable cost (75% of sales or 60,000 × Rs 3.75)	225,000
CM	75,000
Less : Fixed cost	50,000
EBIT	25,000
Less : Interest	10,000
EBT	15,000
Less : Taxes (40%)	6,000
Net income	9,000
Less : Preferred stock divided	0
EAC	Rs 9,000

$$\therefore \text{EPS} = \frac{\text{Earnings available to common stockholders (EAC)}}{\text{No. of common shares}} = \frac{\text{Rs } 9000}{20000} = \text{Rs } 0.45$$

(b) Degree of operating leverage (DFL) $= \frac{\text{EBIT}}{\text{EBT}} = \frac{\text{Rs } 25000}{\text{Rs } 15000} = 1.6667$ times

or, $\text{DFL} = \frac{Q\,(S - V) - FC}{Q\,(S - V) - FC - I}$

$$= \frac{60000\,(\text{Rs } 5 - \text{Rs } 3.75)}{(\text{Rs } 5 - \text{Rs } 3.75) - \text{Rs } 50000 - \text{Rs } 10000} = \frac{\text{Rs } 25000}{\text{Rs } 15000} = 1.6667 \text{ times}$$

(c) If actual EBIT Increased to Rs 30,000, the new earning per share based on DFL = ?

$$\% \text{ Change in EBIT} = \frac{\text{New EBIT} - \text{Old EBIT}}{\text{Old EBIT}} = \frac{30000 - 25000}{25000} = 20\%$$

New EPS = Old EPS (1 + DFL × % change in EBIT)

= Rs 0.45 (1 + 1.66667 × 0.20) = Rs 0.60

(d) DFL if preferred stock divided is Rs 1000

$$\text{DFL} = \frac{\text{EBIT}}{\text{EBIT} - I - \frac{Pd}{1 - t}} = \frac{\text{Rs } 25000}{\text{Rs } 25000 - \text{Rs } 10000 - \frac{\text{Rs } 1000}{1 - 0.40}} = \frac{\text{Rs } 25000}{\text{Rs } 13333.33} = 1.8750 \text{ times.}$$

Total or Combine Leverage

It is to be noted that the operating leverage considers operating section of income statement, whereas financial leverage considers the financial section. The combined use of operating and financial leverage causes considerable change in net income and EPS even there is only a small change in sales is called total leverage. Such combined effect of operating and financial leverage is numerically measured by degree of total leverage (DTL)

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

$$\text{DCL} = \text{DOL} \times \text{DFL} = \frac{\text{CM}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}} = \frac{\text{CM}}{\text{EBT}} = \frac{Q\,(S - V)}{Q\,(S - V) - FC - I}$$

If there is preferred stock dividend

$$\text{Or, DCL} = \frac{\text{CM}}{\text{EBIT} - I - \frac{Pd}{(1 - T)}}$$

The degree of total leverage is the combination of both DOL and DFL and shows the total impact. This value 5 (suppose) indicates that 1 percent change in sales volume will result in 5% change in EPS.

% change in EPS = DTL × % change in sales

New EPS = old EPS (1 + % change in EPS)

or, New EPS = old EPS (1 + % change in sales × DTL)

ILLUSTRATION 6.

Given the following information

Selling price per unit (S)	Rs.5
Variable cost (% of selling price)	75%
Fixed operating cost	Rs.50,000
Interest expenses	Rs.10,000
Preferred stock dividend	Rs.0
Marginal tax rate	40%
Number of common shares	20,000
Production and sales unit (Q)	60,000 units

Required :

(a) Degree of combined leverage (DCL)

(b) If actual sales actually turnout to be Rs 270,000, compute the new EPS based on DTL.

Solution :

(a) $DCL = \frac{CM}{EBT}$ or, $\frac{Q\,(S - V)}{Q\,(S - V) - FC - I}$

$$= \frac{60000\ (Rs\ 5 - Rs\ 3.75)}{60000\ (Rs\ 5 - Rs\ 3.75) - 50000 - 10000} = \frac{75000}{15000} = 5$$

(b) If the sales actually turn out to be Rs.270,000, the new earnings per share based on degree of total leverage ?

$$EPS_0 = \frac{[Q(S - V) - FC - I\,](1 - t)}{\text{No. of shares}}$$

$$= \frac{[60000\ (Rs.5 - Rs.3.75) - Rs.50000 - Rs.10000]\ (1 - 0.40)}{20000} = Rs.0.45$$

$$\% \text{ Change in sales} = \frac{\text{New sales} - \text{Old sales}}{\text{Old sales}} = \frac{270000 - 300000}{300000} = -10\%$$

Now,

$$\text{New EPS} = EPS_{old}\,[1 + (\% \text{ change in sales} \times DCL)]$$

$$= Rs.0.45\ [\ 1 + (-\ 0.10 \times 5)] = Rs.0.45 \times [\ 1 - 0.50] = Rs.0.225$$

- *Table showing effect of leverage*

Leverage	Change	Effect on
Operating	Sales	EBIT
Financial	EBIT or NOL	Net income / EPS
Total or combined	Sales	NI / EPS

- **Distinguish between operating leverage and financial leverage**

Operating leverage	**Financial leverage**
1. Operating leverage represented the relationship between operating profit and sales.	1. Financial leverage represented the relationship between operating profit and earning available to shareholder (EPS).
2. DOL can be calculate based on fixed cost	2. DFL can be calculate based on financial cost
3. DOL is measured the business risk.	3. DFL is measured the financial risk.

Estimating Optimal Capital Structure

The optimal capital structure is the combination of debt, preferred stock and common equity that minimize the weighted average cost of capital (WACC). As the capital structure where the WACC is minimized, the value of the firm's securities is maximized. As a result, the minimum cost of capital structure is called optimal capital structure.

It is difficult to estimate that how a given change in capital structure will affect the stock price. It is noted, that capital structure that maximizes the stock price is also the one that minimize the WACC. WACC is calculated by using following equitation:

$WACC = W_D*K_{dt} + W_P*K_P + W_E*K_E$

Breakeven Analysis

The relationship between sales volume and operating profitability is explored in cost volume profit planning or operating break-even analysis. Break–even point represents the levels of production and sales where operating income (EBIT) is zero. It is the point where revenues from sales just equal total operating cost. Operating break-even analysis is a method of determining the point at which sales will just covers operating cost. It is also shows the magnitude of the firm's operating profits or losses if sales exceeds or falls below that point. Break-even analysis is important in the planning and control process because that cost volume profit relationship can be influenced greatly by the production of the firm's investment in assets, which are fixed.

Condition	Result
Actual sales is equal to break-even sales	No Loss, No Profit [EBIT = 0]
Actual sales exceeds to break-even sales	Profit
Actual sales is less than break-even sales	Loss

Generally, break-even point analysis provides answer to question such as:

(i) What sales volume is needed to avoid losses?

(ii) What sales volume is necessary to earn a desired profit

(iii) What will be the effects of change is prices?

Determination of BEP

Break-even point represents the level of sales where operating profit is zero. It is the point where revenue from sales equal to total operating cost. It is also called operating break-even point, profit or income break-even point and accounting break-even point. The break-even point may be determined by using a formula, table and graph method or a graph. We can determine the break-even point by using formulas:

At break point occurs when the operating profit is zero. For finding this situation revenue must be equal to total cost.

Sales revenue = Total cost

Sales revenue = Fixed cost + Variables cost

Or, Selling price per unit × Sales unit = Fixed cost + Variable cost per unit × Sales units

Or, $S \times Q = FC + V \times Q$

Or, $S \times Q - V \times Q = FC$

Or, $Q (S - V) = FC$

Or, $Q = \frac{FC}{S - V}$

$\therefore$ Break-even point in units (Q_{BE}) $= \frac{FC}{S - V}$

Break-even point in Rupees (S_{BE}) = BEP unit × S

Or, BEP in Rupees (S_{BE}) $= \frac{FC}{1 - \frac{V}{S}}$

P/V ratio or contribution margin ratio $= 1 - \frac{V}{S}$

Operating profit or EBIT (gain or loss) = sales – variable cost – fixed cost

$= Q \times S - Q \times V - FC = Q (S - V) - FC$

After tax operating profit = $[Q (S - V) - FC] (1 - t)$

Where,

S_{BE} = Break-even point in Rs
Q_{BE} = Break-even point in units
S = Selling price per unit
V = Variable cost per unit
FC = Fixed operating cost
EBIT = Earnings before interest and taxes
t = tax rate

Illustration 1.

Consider the following information:
Fixed cost = Rs. 700,000
Variables cost per unit = Rs 10
Selling price per unit = Rs 15
Calculate:

(a) Break-even point in units
(b) Break-even point in Rupees
(c) Gain or loss at break-even point
(d) Gain or loss at sales is 150000 units
(e) Gain or loss at sales is 130,000 units.

Solution :

(a) Calculation of BEP in units (Q_{BE})

We have,

$$Q_{BE} = \frac{FC}{S - V} = \frac{\text{Rs } 700000}{\text{Rs } 15 - \text{Rs } 10} = 1{,}40{,}000 \text{ units.}$$

(b) Calculation of BEP in rupees (S_{BE})

We have,

$$S_{BE} = \frac{FC}{1 - \frac{V}{S}} = \frac{\text{Rs } 700000}{1 - \frac{\text{Rs } 10}{\text{Rs } 15}} = \text{Rs } 2100{,}000$$

Alternatively

$S_{BE} = Q_{BE} \times S = 140{,}000 \text{ units} \times \text{Rs } 15 = \text{Rs } 2100{,}000$

(c) Calculation of gain or loss at sales of 140,000 units (equal to BEP units)

Gain or loss = Q (S – V) – FC

= 1,40,000 (Rs 15 – Rs 10) – Rs 700,000

= Rs 7,00000 – Rs 7,00000 = Rs 0

(d) Calculation of gain or loss at sales of 150,000 units

Gain or loss = 150,000 (Rs 15 – Rs 10) – Rs 7,00000 = Rs 50,000

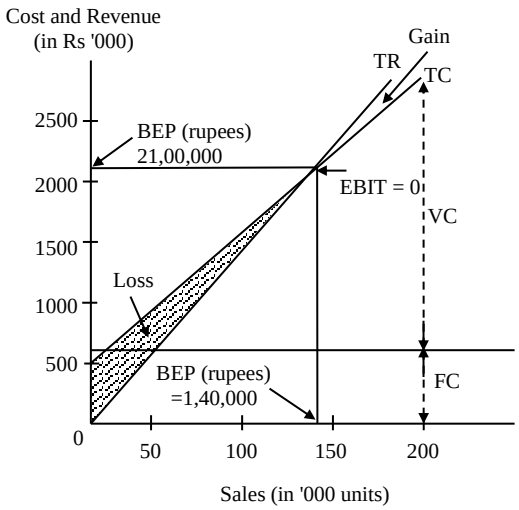
(e) Calculation of gain or loss of sales of 130,000 units

Gain or loss = 130,000(Rs 15 – Rs 10) – Rs 700000 = –Rs 50,000

∴ loss = Rs 50,000.

Alternatively

Level of sales unit (Q)	140,000	150,000	130,000
Sales revenues (Q×V)	2100,000	2250,000	1950,000
Less : Variables cost (Q×V)	1400,000	1500,000	1300,000
Contribution margin (CM)	700,000	750,000	650,000
Less : Fixed cost	700,000	700,000	700,000
EBIT	Rs 0	Rs 50,000	(Rs 50,000)



Applications of cost–volume–profit analysis in business are as follows:

(a) Calculation of sales volume to produce desired profit.

Require sales in units $= \frac{\text{Fixed cost + Desire profit}}{\text{CMPU (S–V)}}$

Require sales in rupees $= \frac{\text{Fixed cost + Desire profit}}{\text{P/V ratio}}$

P/V ratio = $1- \frac{V}{S}$

(b) Required sales (in units) for desire profit after tax = $\frac{FC + \frac{DPAT}{1-t}}{S - V}$

Where, DPAT = Desire profit after tax

t = tax rate

Cash Break–even Point

If the firm that have fixed costs which include a large amount of non-cash expenses (form of depreciation) often find it useful to compute the cash break-even point. The purpose of computing the cash operating break-even point is to determine the level of sales necessary to cover cash operating cost. When break-even point is calculated considering only the cash fixed cost the resulting break-even point is called cash break-even point. To calculate the cash break-even point we have to deduct non–cash outlay (depreciation) from the fixed operating cost. Therefore, cash break-even point is lower than the usual break-even point. Cash break-even point can be determined applying the following equation.

$$Q_{CBE} = \frac{\text{FC – Non cash outlay}}{S - V} = \frac{\text{FC – Depreciation}}{S - V}$$

Non–cash outlay includes specially depreciation,

$$S_{CBE} = \frac{\text{FC – Non cash outlay (Depreciation)}}{1 - \frac{V}{S}}$$

or, $S_{CBE} = Q_{CBE} \times S$

Illustration 2.

Selling price per unit = Rs. 45

Total fixed cost = Rs. 175000 (including depreciation)

Depreciation Rs= 110,000

Variable cost per unit (V) = Rs 20

Calculate:

(a) Operating break-even point

(b) Cash break-even point

Solution :

(a) Operating break-even point:

(i) BEP in units (Q_{BE}) = $\frac{FC}{S - V} = \frac{\text{Rs 175000}}{\text{Rs. 45 – Rs. 20}}$ = 7000 units

(ii) BEP in rupees (S_{BE}) = $\frac{FC}{1 - \frac{V}{S}} = \frac{\text{Rs 175000}}{1 - \frac{\text{Rs 20}}{\text{Rs 45}}}$ = Rs 315000

(b) Cash break-even point:

(i) Cash BEP in units (Q_{CBE}) = $\frac{\text{FC – Depreciation}}{S - V} = \frac{\text{Rs. 175000 – Rs 110000}}{\text{Rs 45 – Rs 20}}$ = 2600 units

(ii) Cash BEP in rupee (S_{CBE}) = $\frac{FC - Depreciation}{1 - \frac{V}{S}} = \frac{Rs\ 175000 - Rs\ 110000}{1 - \frac{Rs\ 20}{Rs\ 45}}$ = Rs. 117000

Here the cash BEP is Rs.117000. The cash BEP is the level of sales needed to cover cash operating costs. If actual sales of firm equal to cash BEP, there will be operating loss. But the firm still becomes able to meet all cash operating expenses.

Short Problems (SP)

SP-1

P/V ratio; You are given the following information.

Sales	Rs 800,000
Variable cost	Rs 500,000
Fixed cost	Rs 150,000

Required : P/V ratio

SP-2

CMPU, BEP and sales; The following information are given to you

Fixed cost	Rs 90,000
Variable cost per unit	Rs 9
Selling price per unit	Rs 12

Required :

(a) Contribution margin per unit
(b) BEP in units and rupees
(c) Required sales units to earn desire profit of Rs 45,000

SP-3

Profit or loss and BEP; The Company produces baby balls which are sold for Rs 30 each, the fixed costs are Rs 150,000 and variable cost are Rs 18 per unit.

Required :

(a) What is the firm's profit or loss at sales of 20,000 units
(b) What is the breakeven point ?

SP-4

PV ratio, BEP and profit; The following information is taken from of Pradhan Corporation.

Fixed cost	Rs 50,000
Variable cost	Rs 6 per unit
Selling price	Rs 10 per unit

Compute :

(a) P/V ratio
(b) BEP sales units and rupees
(c) Profit if sales are Rs 150,000
(d) Sales to make a profit after tax of Rs 6000 at a current tax rate is 40%

SP-5

Degree of operating leverage; Find out degree of operating leverage from the following data.

Sales	Rs 50,000
Variable cost	60%
Fixed cost	Rs 12,000

SP-6

Degree of operating leverage; The following information is provided

Seles units	2000
Selling price per unit	100
Variable cost per unit	Rs 50
Fixed cost	50,000

Required

(a) Degree of operating leverage

(b) Percentage change in EBIT when sales increase by 20%

SP-6

A firm has a fixed operating cost of Rs 50,000 and variable cost per unit is Rs 4. If the selling price per unit is Rs 9, calculate the sales volume in units to earn zero profit**.** *(ans; 10000 units)*

Long Problems (LP)

LP-1 (BH–13.1)

Break–even quantity; A company estimates that its fixed operating costs are Rs.500,000, and its variable costs are Rs.3.00 per unit sold. Each unit produced sells for Rs.4.00. What is the company's break-even point? In other words, how many units must it sell before its operating income becomes positive?

LP-2 (BH–13.4)

Operating break-even analysis: The Butwal Watch Company manufactures a line of ladies watches that is sold through discount houses. Each watch is sold for Rs.25; the fixed costs are Rs.140,000 for 30,000 watches or less; variable costs are Rs.15 per watch.

(a) What is the firms gain or loss at sale of 8,000 watches? of 18,000 watches?

(b) What is the operating breakeven point? Illustrate by means of a chart.

(c) What is the degree of operating leverage at sales of 8,000 units? Or 18,000 units?

(d) What happens to the operating breakeven point if the selling price rises to Rs.31?

(e) What happens to the operating breakeven point if the selling price rises to Rs.31 but variable costs rise to Rs.23 a unit?

LP-3 (WBB–4.6)

Operating break-even analysis; The following relationship exit for S.K. manufacturer of electronic components. Each unit of output is sold for Rs.45; the fixed costs are Rs.175,000 , of which Rs.110,000 are annual deprecation charges: variable costs are Rs.20 per unit.

(a) What is the firm's gain or loss at sales of 5,000 units? Of 12,000 units?

(b) What is the operating income breakeven point?

(c) What is the cash breakeven point?

LP-4 (WBB–4.3)

Degree of leverage: Lumbini Auto-Parts Supplier's Inc's 2013 income statement is shown below.

Income Statement for December 31, 2013(Thousands of rupees)

Sales	Rs.36,000
Cost of goods sold	(25,200)
Gross profit	10,800
Fixed opening costs	(6,480)
Earning before interest and taxes	4,320
Interest	(2,880)
Earning before taxes	1,440
Taxes (40%)	(576)
Net income	864
Dividends (50%)	432

(a) Compute the degree of operating leverage (DOL), degree of financial leverage (DFL), and degree of total leverage (DTL) for firm.

(b) Interpret the meaning of each of the numerical values you computed in part a.

(c) Briefly discuss some ways firm can reduce its degree of total leverage.

LP-5 (WBB–4.8)

Operating leverage; The National Corporation produces, teakettles, which it sells for Rs.15 each. Fixed costs are Rs.700,000 for up to 400,000 units of output. Variable costs are Rs.10 per kettle.

(a) What is the firm's gain or loss at sales of 125,000 units? Or 175,000 units?

(b) What is the breakeven point? Illustrate by means of a chart.

(c) What is Corporations degree of operating leverage at sales of 125,000 units? Or 150,000 units? Or 175,000 units?

LP-6 (WBB–4.12)

Break–even analysis and leverage; SA Company manufactures golf balls. The following income statement information is relevant for SA in 2012.

Selling price per sleeve of balls (p)	Rs.5.00
Variable cost of goods sold (% of price, p)	75%
Fixed operating costs	Rs.50,000
Interest expense	Rs.10,000
Preferred dividends	Rs.0.00
Marginal tax rate	40 %
Number of common shares	20,000

(a) What level of sales dose SA needs to achieve in 2012 to breakeven with respect to operating income?

(b) At its operating breakeven, what will be the EPS for SA?

LP-7 (VH–SC–1)

Operating break-even analysis; Asian Paint Company has fixed operating costs of RS.3 million a year. Variable operating costs are Rs.1.75 per half–pint of pint produced, and the average selling price is Rs.2 per half–pint.

(a) What is the annual operating break-even point in half–pint, (Q_{BE})? In rupees of sales (Q_{BE})?
(b) If variable operating costs decline to Rs.1.68 per half–pints, what would happen to the operating break-even point (Q_{BE})?
(c) If fixed costs increase to Rs.3.75 million per year, what would be the effect on the operating break-even point (Q_{BE})?
(d) Compute the degree of operating leverage (DOL) at the current sales level of 16 million half–pints.
(e) If sales are expected to increase by 15 percent from the current sales position of 16 million half pints, what would be the resulting percentage change in operating profit (EBIT) from its current position?

LP-8

Break-even analysis; The following information is given for the purpose of calculating break-even point:

Sell price per unit	Rs 5
Variable cost per unit	Rs 3
Fixed cost (including depreciation of Rs 8000)	Rs 24,000

You are required to calculate (i) operating break-even point, (ii) cash break-even point, (iii) operating break-even point if the desired profit is Rs 30000 and (iv) desired profits after income tax is Rs 20000 and income tax is 40 percent.

LP-9

Cosmic Airline's fixed operating costs are Rs 5.8 million and its variable cost ratio is 0.20. The firm has Rs 2 million in bonds outstanding with a coupon interest rate of 8 percent and 1 million, 5 percent bank loan. Cosmic has 30,000 shares of preferred stock outstanding, which pays a Rs 2.00 annual dividend. There are 100,000 shares of common stock outstanding. Revenues for the firm are Rs 8 million, and the firm is in the 40 percent tax rate.

(a) Compute Cosmic's degree of operating leverage.
(b) Compute its degree of financial leverage.
(c) If sales increase to Rs 10 million forecast Cosmic Airline's earnings per share.

(ans. a.10.67 times b. 2.069 times c. Rs.11.34)

LP-10

Everest Sugar Mills has degree of operating leverage (DOL) of 2 at its current production and sales level of 10000 units. The resulting operating income figure is Rs 1000.

(a) If sales are expected to increase by 20 percent from the current 10000 units sales position, what would be the resulting operating profit figures ?
(b) At the company's new sales position of 12000 units, what is the firm's new DOL figure ?

(ans. a. Rs.1400 b.1.71 times)

LP-11

The capital structure of the Progressive Company Ltd. consists of an ordinary share capital of Rs. 1,000,000. (shares of Rs.100 par value) and Rs. 1000,000 of 10% debentures. The unit sales increased by 20% from 100,000 units to 120,000'units, the selling price is Rs.10 per unit, variable cost amount to Rs.6 per unit and fixed operating expense amount to Rs.200,000. The income tax rate. is assumed to be 35%. You are required to calculate:

(a) The percentage increase in EPS
(b) The degree of financial leverage at 100,000 units and 120,000. units.

(c) The degree of operating leverage at 100,000 units and 120,000 units.

(ans. a. 80% b. 2 & 1.56 times c. 2 & 1.714 times)

LP-12

Given, the following information of firm A and B

Firm A:

Break-even point in units = 25000;
Total fixed cost = Rs.80000
Total revenue at BEP = Rs.200000

Firm B:

Break-even point in units = 30000;
Total fixed cost = Rs.120000
Total revenue at BEP = Rs.240000

(a) Which firm has the higher operating leverage at only given level of sales? Explain.

(b) At what level of sales in units do both firm's earn the same operating profit?

(c) If both the company require an after tax profit Rs.36000; what is the target units of sales required in each company? Assume corporate tax rate is 40%**.** (ans. a. Firm B b.50000 units c. 43,750 and 45,000 units)

LP-13

A newly employed manager of the ABC Company holds an MBA degree from a reputed university. Upon joining the company, he thought it would be better to gather some relevant information before he makes decisions on any matter. He found that the company is running at a contribution margin of 50 percent which account for Rs.3 per unit. He was told that the company's break-even profit is about 9,000 units and the fixed cost runs about Rs. 12,000. It is expected that the total sales will reach to Rs. 15,000 during the current year.

(a) Are the information given to him consistent?

(b) If the break–even point as given is correct, what is the correct amount of fixed cost of the company?

(c) What is selling price ?

(d) What is the anticipated profit ?

(ans. a.4000 units (not consistent) b. Rs 27000 c. Rs 6 d. – Rs 4500)

LP-14

A project is projected of break-even on an accounting basis in its third year. Sales for the third year are projected at 12000 units. Depreciation at that time will be Rs.13000. the price per unit less variable cost per unit is Rs.15. what will be the fixed costs? If fixed cost is increased by 10 percent, what is its break-even point in units?

LP-15

Dream inc. has expected annual free cash flow (FCF) of Rs 350,000 for indefinite future. The average cost of capital is 10% and the market value of debt is Rs 500,000. Calculate the market value of equity.

Solution

Value of the firm = $\frac{FCF}{K_o} = \frac{350000}{0.10}$ = Rs 3500000

Value of the equity = Value of the firm – Value of the debt = Rs 3500000 – Rs 500000 = Rs 3000000

Answer Sheet

Short problems

1. 0.375 **2. (a)** Rs 3 **(b)** 30,000 units; Rs 360,000 **(c)** 45000 units **3. (a)** Rs 90,000 **(b)** 12500 units; Rs 375000 **4. (a)** 0.40 **(b)** 12500 units; Rs 125000 **(c)** Rs 10,000 **(d)** Rs 150,000 **5.** 2.5 times **6. (a)** 2 times **(b)** 40%

Long problems

1. 500000 units
2. (a) (i) – Rs.60000 (ii) Rs.40000 (b) 14000 watches, Rs.350000
   (c) (i) – 1.33 (ii) 4.5 (d) (i) 8750 units (ii) Rs. (e) 17500 units, Rs.542500
3. (a) – Rs.50,000, Rs.125,000 (b) 7000 units, Rs.315,000 (c) 2600 units, Rs.117,000
4. (a) DOL = 2.5, DFL = 3, DTL = 7.5
5. (a) –Rs.75,000, Rs.175,000 (b) 140,000 units, Rs.2100,000 (c) –8.33, 5
6. (a) 40,000 balls (b) –Rs.0.30 (c) 48,000 units
   (d) (i) EPS = Rs.0.45, DOL = 3, DFL = 1.67, DTL = 5 (ii) Rs.0.23
7. (a) 12 million half pints, Rs.24 million (b) 9.375 million half pints
   (c) 15 million half pints (d) 4 (e) 60% increase in EBIT

Units - 6

Dividend Decision

Meaning of dividend Policy

- Companies that earn a profit can decide either of three ways: pay that profit out to shareholders, reinvest it in the business through expansions ,debt reductions or share repurchased, or both.
- When a portion of the profit is paid out to the shareholders, the payment is known as dividend. Dividend is the earnings or profit distributed to the shareholders by a company.
- It is distributed in cash and securities or combination of these.
- Dividends are paid quarterly, half yearly or annually. Similarly the dividend is distributed to preference shareholders and equity shareholders.
- The dividend paid to the preference shareholders is called preference share dividend, which is generally fixed or constant and distributed before distributing to the common shareholders.

- The percentage of earnings paid out in the form of cash dividends is known as dividend payout ratio and its calculate as follows:
- Dividend payout ratio = dividends/ net income
- Retention ratio= $\frac{Net\ Income - Dividend}{Net\ Income}$
- Retention ratio= 1- Dividend payout ratio

Con…..

- The policy of a company on the division of its profit between distribution to shareholders as dividend and retention for its investment is known as dividend policy.
- Dividend policy is to determine the amount of earnings to distribute to shareholders and the amount to be retained or reinvestment in the firms.
- Any change in dividend policy has both favorable and unfavorable effects on the firm's stock price.

Cond…

- For example shareholders get excess dividend in present that increases market value of shares, which is favorable aspect.
- But in future, the firm can not invest in profitable project due to lack of internal capital (Retained earnings).
- As the result the future growth rate of the firm decreases that causes unfavorable effects in share value.

DIVIDEND PAYMENT PROCEDURES

1. **Declaration date**
2. **Record date or holder of record date**
3. **Ex-dividend date**
4. **Payment date**

Cond…

1. **Declaration date**

This is the day on which the board of directors declares the dividend. At this time they set the amount of the dividend to be paid, the holder-of –record date, and payment date. Generally, the dividend is announced as a percentage of the par value of the stock.

Cond….

2. Holder-of record date

This is the date the company opens the ownership books to determine who will receive the dividend; the stockholders of record on this date received the dividend.

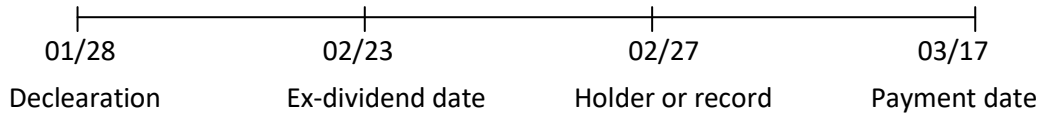
Cond…

3. **Ex-dividend date**

This date is four days prior to the record date. Shares purchased after the ex-dividend date are not entitled to the dividend.

2**. Payment date**

This is date when dividend checks are actually mailed to the holders of record.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02/23
Ex-dividend date
02/27
Holder or record
03/17
Payment date

FACTORS AFFECTING DIVIDED POLICY

1. **Desire of shareholders**
2. **Legal rules**
3. **Liquidity position**
4. **Need to repay debt**
5. **Restriction in debt contracts**
6. **Rate of asset expansion**
7. **Profit rate**
8. **Stability of earning**
9. **Access to the capital market**
10. **Policy of Control**
11. **Tax position of stock holders**

DIVIDEND PAYOUT SCHEME OR DIVIDEND PAYOUT POLICIES

- **Residual dividend policy**
- **Constant dividend per share**
- **Constant payout ratio**
- **Low regular dividend plus extra policy**

1. **Residual dividend Policy**

If a company has profitable investment opportunities ($r > k$), the company invest the required amount of the earning and the remaining amount of the earnings is distributed as dividend. Such types of policy is called dividend policy. A firm using residual policy would follow these four steps:

Cond…

i. Determine the optimal budget/ investment.
ii. Determine the amount of equity needed to finance that budget or capital structure.
iii. To uses retained earning to meet equity requirement.
iv. To pay dividends if more earnings are available than are needed to support the optimal capital budget.

Earnings available to common stock holders (EAC)		**xxx**
Less : Equity financing needs :		
Total financing requirement	xxx	
Less : funds from debt	xxx	
Funds from equity/Equity financing needs	xxx	xxx
Residual dividend if '+' External equity requirement if '–'		± xxx

Divided payment = Net income –(Total capital budget × target equity ratio)

= Net income – (Investment opportunity × retained earning ratio)

$$\text{Dividend payout (D/P) ratio} = \frac{\text{Residual divided}}{\text{Total earnings after tax}} \times 100$$

Ncell Telecommunications has a target capital structure that consists of 70 percent debt and 30 percent equity. The company anticipates that its capital budget for the upcoming year will be Rs.3,000,000. If Ncell reports net income of Rs.2,000,000 and it follows a residual dividend payout policy, what will be its dividend payout ratio?

Cond...

2.Constant dividend per share

Constant dividend policy is based on the payment of a fixed rupee dividend. The policy of paying fixed amount per share as dividend every period, without fluctuation in the earning of the company. This policy does not imply that dividend per share will never increase. When the company reaches the new level of earnings, the annual dividend per share will increase. It is suitable for that investor whose only income source is dividend.

The net income of the ABC company for different years are given below :

Year	2006	2007	2008	2009	2010
Net income	Rs 60,000	Rs 40,000	Rs 30,000	Rs 50,000	Rs 70,000

The ABC company has 10,000 shares outstanding and the dividend for each share has been fixed for Rs 3. Calculate earnings per share and dividend per share for each year.

Solution :

Calculation of earnings per share and dividend per share for each year.

Year	2006	2007	2008	2009	2010
Net income	Rs 60,000	40,000	30,000	50,000	70,000
Dividend	30,000	30,000	30,000	30,000	30,000
EPS	Rs 6	4	3	5	7
DPS	Rs 3	3	3	3	3

$$DPS = \frac{\text{Dividend}}{\text{No. of shares}}$$

$$EPS = \frac{\text{Net income}}{\text{No. of shares}}$$

Cond…

3**. Constant payout ratio**

if the fixed percentages of earnings are paid as dividend in every period, the policy is called constant payout ratio. The earnings fluctuate that means rupee amount of dividend will fluctuate. It ensures that dividends are paid when profit are earned and avoided when losses incur.

The net income of the ABC company for different years are given below :

Year	2006	2007	2008	2009	2010
Net income	Rs 60,000	Rs 40,000	Rs 30,000	Rs 50,000	Rs 70,000

The ABC company has 10,000 shares outstanding and the dividend for each share has been fixed for Rs 60% computed earnings per share and dividend per share for each year.

Solution :

Calculation of earnings per share and dividend per share for each year.

Year	2006	2007	2008	2009	2010
Net income	Rs 60,000	40,000	30,000	50,000	70,000
Dividend	Rs 36000	24,000	18,000	30,000	42,000
EPS	Rs 6	4	3	5	7
DPS	3.60	2.40	1.80	3.0	4.20

Cond…

4. Low regular dividend plus extra policy

this policy is the compromise between the two policy mentioned above (2 & 3). If the firm's earnings are volatile, however, the policy will be the best choice. The low regular dividend can usually be maintained even when earning decline and extra dividend can be paid when excess funds are available.

The net income of the ABC company for different years are given below :

Year	2006	2007	2008	2009	2010
Net income	Rs 60,000	Rs 40,000	Rs 30,000	Rs 50,000	Rs 70,000

The ABC company has 10,000 shares outstanding and the company policy is paying a regular dividend of Rs 2 per share and extra dividend 40% of earning per share is provided. Calculate earnings per share and dividend per share for each year.

Solution :

Calculation of earnings per share and dividend per share for each year.

Year	2006	2007	2008	2009	2010
Net income	Rs 60,000	40,000	30,000	50,000	70,000
EPS	Rs 6	4	3	5	7
Regular DPS (given)	Rs 2	2	2	2	2
DPS [40% of EPS]	2.4	1.6	1.2	2	2.8
Extra DPS	0.4	00	0.0	0	0.8
Total DPS (Regular DPS + extra DPS	Rs 2.4	2.0	2.0	2.0	2.8

TYPES OF DIVIDEND

- **Cash Dividend**
- **Stock Dividend**

Cond....

1. **Cash Dividend**

cash dividend is the dividend, which is distributed to shareholder in cash out of the earning of company. When cash dividend is distributed both total assets and net worth(shareholders' equity) of the company decreases as cash and earning decrease . The market price of the share drops in must case by the amount of the cash dividend distributed.

A firm has 400000 outstanding shares of Rs.2 per common stock, a contributed capital in excess of par account of Rs.6.4 million and retained earnings of Rs.32 million all before the declaration of dividends. The board of directors declared a Rs.3 per share cash dividend. What are the balances in equity accounts if the fair market value of stock is Rs.25 per share?

Cond....

2. **Stock Dividend**

An issue of shares to existing shareholder instead of paying a cash dividend is known as stock dividend. It is also known as bonus shares. Company issues stock dividend if they have no sufficient cash balance to pay cash dividend. The numbers of shares increase by distributing the stock dividend. It is only transferring of fund from retained earnings to capital account therefore it does not affect the wealth of shareholders.

(a) MPS after stock dividend $= \dfrac{\text{MPS before stock dividend}}{1 + \%\text{ of stock dividend}}$

or, MPS after stock divided $= \dfrac{\text{Total value of share before stock dividend}}{\text{Total No. of shares after stock dividend}} = \dfrac{P_0 \times N}{N + n}$

Where, N = No. of outstanding shares before stock dividend

n = No. of shares under stock dividend or bonus shares.

(b) EPS after stock dividend $= \dfrac{\text{EPS before stock dividend}}{1 + \%\text{ of stock dividend}}$

(c) DPS after stock dividend $= \dfrac{\text{DPS before stock dividend}}{1 + \%\text{ of stock dividend}}$

Cond...

Effect of stock Dividend

- Increased in number of shares.
- Retained earnings transfer to share capital.
- Decreased in retained earnings.
- Par value of shares remain unchanged.
- Do not change in shareholders equity fund.
- DPS, EPS, will decreased if the total profit does not increased.
- MPS will decreased.

Cond…

Significant of stock dividend

The company gives stock dividend if they have no sufficient cash balance to pay cash dividend. Others reason of issuing stock dividends are as follows:

- To bring the share price at reasonable ranged (or trading range)
- To provide psychological value to the investors
- To provide tax benefit to the investors
- To increase share capital
- To reserve cash in organization

A firm has 400000 outstanding shares of Rs.2 per common stock, a contributed capital in excess of par account of Rs.6.4 million and retained earnings of Rs.32 million all before the declaration of dividends. The board of directors declared a 25% stock dividend. What are the balances in equity accounts if the fair market value of stock is Rs.25 per share?

Stock Split

Stock split is sub division of share with which the number of shares are increased with the proportional reduction in par value of stock without any change in owner's equity or net worth. For example, in a 2 for 1 stock split, an investor will own 100 shares valued at Rs.100 per share before the stock split will owns 200 shares valued at Rs. 50 per share after the split.

Cond…

Effect of stock split

- Number of shares increased .
- Market price per share decreased.
- Earnings and dividend per share are decreased.
- Additional paid on capital and retained earnings are remain unchanged.
- Total wealth position of the shareholders remains unchanged.

Cond...

Significant of stock split

Company goes for stock split, when price of stock exceptionally high. The basic objective of stock split is to bring down the market price of share into the tradable (or reasonable) range. As a result small investor can purchase the company's shares.

SPM company has outstanding shares of Rs.20,00,000 with a par value per share Rs.4 each. The premium recorded Rs.64,00,000 and the retained earnings amounting to Rs.232,00,000. The board of director declared Rs.0.50 as cash dividend per share and 25% as stock dividend. The market value per share is raised to Rs.10. Find out effect of change in equity premium and retained earnings. Also show effect of 8 for 2 stocks split.

Reverse Stock Split

A decrease in a firm's number of shares outstanding without any change in owner's equity is called reverse stock split. Where reduction of numbers of shares occurs with proportionate increases in par value. For example, in a 1 for 2 reverse stock split, an investor will own 100 shares valued at Rs.50 per share before the reverse stock split will owns 50 shares valued at Rs. 100 per share after the reverse stock split.

The purpose of reverse stock split, if the market price of the stock is relatively low. The basic objective of reverse split is to increase in the price of share from certain level.

Cond...

Effect of reverse stock split

- Number of share decreased.
- Par value per share increased.
- EPS, DPS, and MPS are decreased.
- Additional paid in capital and retained earnings are remain unchanged.
- Total wealth position of shareholder's remain unchanged .

SPM company has outstanding shares of Rs.20,00,000 with a par value per share Rs.4 each. The premium recorded Rs.64,00,000 and the retained earnings amounting to Rs.232,00,000. The company has MPS, EPS and DPS are Rs.10, Rs.2and Rs.1 respectively. Find out effect of change in equity share holder account, MPS, EPS and DPS after 1 for 2 stock reverse.

Re-purchase of stock

Stock repurchase is buying back its own shares by company from the markets. Stock re-purchased by the issuing firm is called ***treasury stock*** and does not pay dividend and voting rights. When the company needs money future then the treasuring stock (re-purchased stock) can be resold. If a firm has excess cash and insufficient profitable investment opportunities may use to re-purchases of stock as an alternative to the cash dividend.

Cond…

Reasons for stock re-purchase

A company repurchases its own stock due to number of reasons such as:

- to bring a change in the existing capital structure (use more debt),
- to increase the value of stock in future,
- to benefit tax for certain shareholders
- to distribute temporary excess cash
- to manage excess liquidity.

Cond…

Method of stock repurchase

Stock re-purchases are usually made in one of the three ways :

- A publicly owned firm can buy back its own stock through a broker on the ***open market.***
- The firm can make a ***tender offer.***
- The firm can purchase a block of shares from one large holder on ***negotiated basis*****.**

The Bank of Kathmandu is planning to re-purchased 40,000 shares out of its 400,000 shares outstanding. Prior to the shares re-purchase announcement, the share price Rs 1500 each what is the equilibrium price after re-purchase ?

Solution:

Given, Number of shares to be re-purchased (N) = 40000

Number of shares outstanding (S) = 400,000

Current market price per share (PC) = Rs 1500

Equilibrium price after re-purchased (P) = ?

We know that,

$$\text{Equilibrium price after re-purchased } (P) = \frac{S \times PC}{S - N} = \frac{400000 \times \text{Rs } 1500}{400000 - 40000} = \text{Rs } 1666.67$$

Units - 7

Working Capital Management

Meaning of working capital

- Working capital means capital required for day to day operation of an enterprise.
- It is concerned with current assets and current liabilities.
- The term current assets refer to those assets which can be converted into cash with in one operating cycle or accounting period without undergoing a diminution in value and without disrupting the operations of the firm.
- The major current assets are cash, marketable securities, account receivable and inventory.
- Current liabilities which are payable within one operating cycle or accounting period.
- The basic current liabilities are account payable, bills payable, bank overdraft and outstanding expenses.
- Therefore the goal of working capital management is to manage the firm's current assets and liabilities in such a way that satisfactory level of working capital is minted

Types of Working Capital

Gross Working Capital

Gross working capital refers to the total investment in the current assets of the firm. Current assets refer to those assets, which can be converted into cash within one year. For example cash marketable securities, inventory, account receivable etc. Gross working capital is also known as total working capital. According to gross concept working capital = Total current assets.

Net Working Capital

Net working capital is the difference between current assets and current liabilities, which are paid within a year, for example, account payable, bills payable, bank overdraft and outstanding expenses.

- Net working capital = Total current assets – Total current liabilities

Con…..

Permanent Working Capital

The minimum amount of current assets which the firm has to hold for all time to come to carry an operation at any time is termed as permanent or regular working capital.

Temporary Working Capital

It represents the additional assets which are required at different time during the operating year. It is also called variable or fluctuating working capital.

Importance and significant of WC

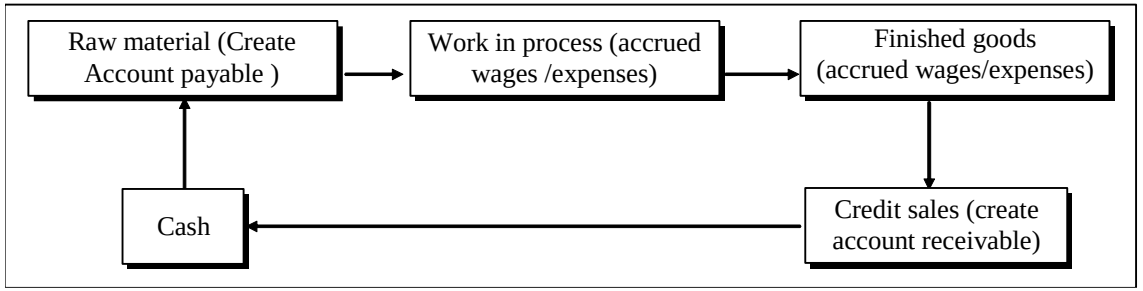
- The working capital is the life blood of any business enterprise. Without adequate working capital no business enterprise can run successfully. The importance of working capital is as follows:
- To run the day to day operation the business activities:
- To make quick payment and helps in creating and maintaining good will of the firm.
- To make regular and timely payment of wages, salaries as well as meet day to day operational expense.
- To ensures regular supply of raw materials and helps to continue the production process.
- To obtain credit facility from suppliers.
- It enables a concern to pay regular divided.
- It enables a concern to face business crisis.
- It enables to avail earn discount as purchase.
- It helps in maintaining solvency of the business.

Factors affecting the WC

1. **Size and nature of business**
2. **Production cycle**
3. **Business up-down**
4. **Organization's credit policy**
5. **Growth and expansion of attitudes**
6. **Profit and dividend distribution policy**
7. **Change in price**
8. **Work efficiency**

Cash Conversation Cycle

Figure : Working capital management process



Con….

- In the above figure, working capital cash flow cycle or cash conversion cycle is the length time between the companies makes payments and when it receives the cash payment. The time duration required to complete one cycle of business is called working capital cash flow cycle. Usually a company acquires inventory on credit, which result in account payable. A company can also sells products on credit, which result in account receivable. Cash therefore is not involved until the company the accounts payable and collected accounts receivable. So the cash conversion cycle measured the time between outlay of cash and cash recovery.

Con…..

1. Inventory Conversion Period (ICP)

The inventory conversion period is the average length of time required to convert raw material into finished goods and them to sell those goods

$$ICP = \frac{360 \text{ days}}{\frac{\text{Cost of goods sold}}{\text{Inventory}}} = \frac{\text{Inventory} \times 360 \text{ days}}{\text{cost of goods sold}}$$

If cost of goods sold is not given

$$ICP = \frac{\text{Inventory} \times 360 \text{ days}}{\text{sales}}$$

$$\text{or, } ICP = \frac{\text{days in year}}{\text{Inventory turnover}}$$

2. Receivable Conversion or Collection Period (RCP)

The receivable conversion period is the average length of time required to convert the firm's receivable into cash. It is also called day's sales outstanding (DSO) or average collection period (ACP).

$$RCP = \frac{\text{Receivable}}{\text{Credit sales} / 360 \text{ days}} = \frac{\text{Receivbale} \times 360 \text{ days}}{\text{Credit sales}}$$

$$RCP = \frac{\text{Days in year}}{\text{Account receivable turnover ratio}}$$

3. Payable Deferred Period (PDP)

The payable deferral period is the average length of time between the purchase of raw material and labour and then payment of cash for them. It can be calculate as under.

$$\text{PDP} = \frac{\text{Account payable}}{\text{credit purchase} / 360} = \frac{\text{Account payable} \times 360}{\text{credit purchased}}$$

$$\text{If credit purchased is not given } \frac{\text{Account payable} \times 360}{\text{cost of goods sold}}$$

$$\text{PDP} = \frac{\text{Days in year}}{\text{Account payable turnover ratio}}$$

4. Cash Conversion Cycle (CCC) or Cash Cycle (CC)

It is the length of the time between paying for raw material and receiving cash from the sales of finished goods.

CCC = ICP + RCP – PDP

Operating cycle = ICP + RCP

Con….

The CCC can be shortened by;

- Reducing the inventory conversion period by processing and selling goods more quickly.
- Reducing the receivable collection period by speeding up collections.
- Lengthening the payables deferral period by slowing down, its own payments.

Useful Ratios

1. Inventory turnover ratio = $\frac{cost\ of\ goods\ sold}{Inventory}$
2. Inventory Turnover ratio = $\frac{days\ in\ year}{ITR}$
3. Return on assets = $\frac{Net\ income}{Total\ assets}$
4. Return on equity $\frac{Net\ income}{Equity}$
5. Working capital requirement = working capital per day× CCC
6. Equity = common stock + Retained earning
7. Total assets = current assets + fixed assets
8. Current assets = Cash and marketable securities + receivable + inventory

ALTERNATIVE CURRENT ASSETS INVESTMENT POLICIES

(a) Conservative current assets investment policy

Conservative current assets policy carries a high level of current assets to support the given level of sales. It uses less short-term debt and more long-term debt for current asset financing. Therefore conservative policy lower risk and lower profitability than aggressive policy. This policy is also known as relaxed policy.

(b) Aggressive current asset investment policy

Aggressive current assets policy carries a low level of current assets to support the given level of sales. It uses more short-term debt and less long-term debt for current assets financing. Therefore aggressive policy is riskier and profitable than conservative policy. This policy is also known as tight or restricted policy.

(c) Moderate current asset investment policy

Moderate current assets policy carries a moderate level (average level) of current assets to given level of sales. Moderate policy uses average/ mid range of short-term and long-term debt of the above two policies. Therefore the moderate policy results in mid range risk and return. This policy is known as average policy.

Short term investment

Fund available for one year or less and use to finance working capital is called short term financing. The major sources of short term financing are short term bank loan, trade credit (creditors and bills payable) and outstanding expenses.

2/10 net 30

Annual percent cost of trade credit

$$= \frac{d}{100-d} \times \frac{days\ in\ year}{CP-DP}$$

Where, d= discount rate; CP = credit or net period; DP = discount period

=2/98 ×365/20 = 37.24%

Cash Management

The term cash includes coins, currency and cheques held by the firm and balances in bank accounts. Sometimes near cash items (that can easily be converted into cash), such as marketable securities or bank time-deposits are also included in cash. Cash is the important current assets for the operation of the business. On the other hand cash is non-earnings asset. Therefore the firm should keep sufficient cash, neither more or less. More cash balance earns nothing but it earns if it is invested in marketable securities and insufficient cash balance creates problem to run business because the firm needs cash to pay for credit purchased, wages, salary, taxes, rent and so on. Therefore the adequate cash balance is necessary to run business organization efficiently and effectively. The major function of the financial manager is to maintain a sound cash position.

Motives for holding cash

- **Transaction motive**
- **Compensation motive**
- **Precautionary motive**
- **Speculative motive**

Functions of Cash Management

- **Cash planning**
- **Managing the cash flows**
- **Determination of optimum cash balance**
- **Investing surplus cash**

Cash Budget

A cash budget is schedule or statement showing cash receipts, cash disbursement and cash balance for a firm over a specified time period. A cash budget is a summary statement of the firm's expected cash inflows and outflows over a projected time period. It gives information as the timing and magnitude of expected cash flow and cash balance over the projected period. This information helps the financial manager to determine the future cash needs of the firm, plan for the financing of these needs and exercise control over the cash and liquidity of the firm.

Specimen of cash budget

Particular	January	February
A. Receipts section		
Opening balance b/d	- - - -	- - - -
Cash sales	- - - -	- - - -
Collection from debtors	- - - -	- - - -
Sales of securities/ assets	- - - -	- - - -
Interest /dividend received	- - - -	- - - -
Other cash receipts	- - - -	- - - -
Total cash receipts	- - - -	- - - -
B. Disbursement section		
Cash purchased	- - - -	- - - -
Payment to creditors	- - - -	- - - -
Salaries and administrative expenses	- - - -	- - - -
Payment to securities	- - - -	- - - -
All other cash payment	- - - -	- - - -
Total cash disbursement	- - - -	- - - -
C. Cash surplus or Deficit section		
Closing Balance (A-B)	- - - -	-------

Prepare a cash budget of a company for April, May and June 2010.

	Months	Sales (Rs)	Wages (Rs)	Purchase (Rs)	Expenses (R)
Actual	January	80,000	20,000	44,000	4,000
	February	80,000	16,000	40,000	8,000
	March	70,000	22,000	44,000	6,000
Budget	April	88,000	20,000	44,000	8,000
	May	84,000	20,000	44,000	6,000
	June	88,000	18,000	36,000	4,000

Additional information

(a) 20% of sales are cash 50% of remaining is collected in same month and balance after 1 month.
(b) 20% of purchase are for cash and remaining are paid after and 1 month.
(c) Wages are paid half monthly. Expenses and paid after one month.
(d) The rent of Rs 1000 is not included in expenses. The rent is paid monthly.
(e) Cash balance on April, 2010 may be assumed to be Rs 20,000.

Cash Budget
For April, May and July 2010

Particulars	April (Rs)	May (Rs)	June (Rs)
Opening balance b/d	20,000	28,800	41,400
Add : Receipts :			
Cash sales	17,600	16,800	16,000
Collection from debtors :			
Current month	35,200	33,600	32,000
Last month	28,000	35,200	33,600
(A) Total receipts	100,800	114,400	123,000
Less : Payments :			
Cash purchase	8,800	8,800	7,200
Payments of creditors	35,200	35,200	35,200
Wages :			
Current month	10,000	10,000	9,000
Last month	11,000	10,000	10,000
Rent	1,000	1,000	1,000
(B) Total payment	72,000	73,000	68,400
Closing balance (A – B)	28,800	41,400	54,600

Cash Management Techniques

1. Speedy cash collections

(a) Prompt Payment by Customers.

(b) Early Conversion of Payments into Cash:

(i) Concentration Banking

(ii) Lock Box System

Con…

2. Slowing disbursements

(a) Avoidance of Early payment

(b) Centralized Disbursement

(c) Float

-Disbursement Float

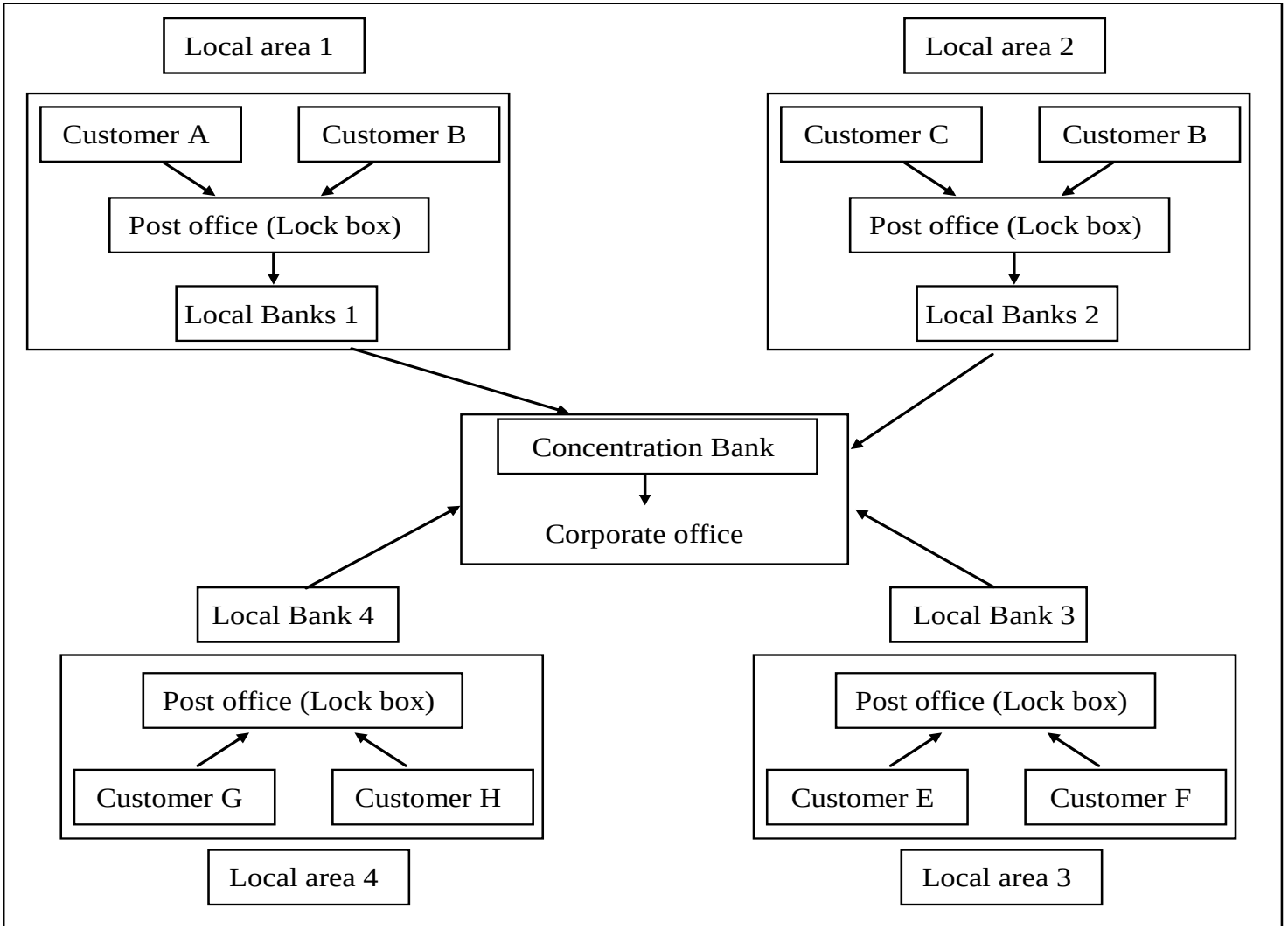
-Collection Float

-Net Float

(d) paying from a distant bank

(e) Cheque-encashment analysis

(f) Accruals


Local area 1
Local area 2
Customer A
Customer B
Customer C
Customer B
Post office (Lock box)
Post office (Lock box)
Local Banks 1
Local Banks 2
Concentration Bank
Corporate office
Local Bank 4
Local Bank 3
Post office (Lock box)
Post office (Lock box)
Customer G
Customer H
Customer E
Customer F
Local area 4
Local area 3

Each business day, on average, a company writes cheques totaling Rs.12,000 to pay its suppliers. The usual clearing time for these cheques it five days. Meanwhile, the company is receiving payments from its customers each day, in the form of cheques, totaling Rs.15,000. The cash from the payments is available to the firm after three days. Calculate the company's disbursement float, collection float, and net float and also interpret the results.

Solution:

Given;

Daily cheque written on average = Rs.12000
Disbursement delay = 5 days
Daily cheque received on average = Rs.15000
Collection delay = 3 days

Calculation of the disbursement float, collections float and Net float

Disbursement float in rupees = disbursement delay × daily check written
= 5 days × Rs.12,000 = Rs.60,000

Collection float in rupees = Collection delay × daily check received
= 3 days × Rs.15,000 = Rs.45,000

Net float in rupees = Disbursement float – Collection float
= Rs.60,000 – Rs.45,000 = Rs.15,000

This company has positive net float i.e. Rs.15000. It means there fast collection and slow disbursement of cash in this company. It proves that there is efficient cash management in this company and we can used this excess of Rs 1500 without any cost.

Inventory Management

- The word 'inventory' means the stock of various types of goods. The various forms of material held by an enterprise are known as inventory. It includes raw material, work in progress, finished goods, daily consuming goods and so on. Inventories represent the major element in the working capital of an enterprise.
- Both excessive and inadequate inventories are not desirable i.e. these are two dangerous points within which the firm should operate. The excessive level of inventories consume the funds of the firm, which cannot be used for any other purposes and thus, involves an opportunity cost. Maintaining an inadequate level of inventories is also dangerous. If the inventories are not sufficient to meet the demand of the customers regularly, the customers may shift to the competitors which will amount to a permanent lose to the firm.
- The aim of inventory management, thus, should be avoid excessive and inadequate levels of inventories and to maintain sufficient inventory for the smooth productions and sales operations.

TYPES OF INVENTORY

- **Raw materials**

Raw materials are those basic inputs that are converted into finished products through manufacturing process. In other words raw material inventories are those units, which has been purchased and stored for future production.

- **Work-in- progress**

Working progress inventories are semi-manufactured products they represent products that need more work before they become finished products for sales.

- **Finished goods**

Finished goods inventories are those completely manufactured products, which are ready for sales. Stock of raw materials and working progress facilitate production, while stock of finished goods is required for smooth marketing operations.

OBJECTIVE OF HOLDING INVENTORIES

- **Transaction motive**

Every firm holds adequate amount of inventories to facilitate smooth production and sales operation. Adequate amount of inventories are necessary to meet the day to day requirement of sales, production process, customer demand and so on.

- **Precautionary motive**

It guards against the risk of predictable changes in demand and supply forces and other factors such as strike, transport disturbances, short supply. In such situations, the firm holds the adequate amount of inventories to continue production operation

- **Speculative motive**

It influences the decision to increase or reduce inventory levels to take advantages of price fluctuations. It helps the firm to earn extra profit in the case of expected price rise in market and sufficient level of inventory may helpful to earn profit in case of expected shortage in the market. To get quantity discount, the firm may purchased inventories in a larger quantity.

Economic Order Quantity(EOQ)

EOQ is that inventory level which minimizes the total cost of ordering and carrying. At the optimal order size the total ordering cost is equal to total carrying cost. Determining an optimum inventory level involves two types of costs.

1. Carrying cost

2. Ordering cost

a. $EOQ = \sqrt{\frac{2AO}{C}}$

b. Average inventory $= \frac{EOQ}{2}$ + Safety stock

c. Maximum inventory = EOQ + safety stock

d. No. of order $= \frac{A}{EOQ}$

e. Period of order $= \frac{\text{Days in year}}{\text{No. of order}}$

f. Total Cost = Ordering cost + carrying cost

$$= \frac{A}{EOQ} \times O + [\frac{EOQ}{2} + \text{Safety stock}] \times C$$

$$= \frac{A}{EOQ} \times O + \frac{EOQ}{2} \times C + \text{Safety stock} \times C$$

If safety stock is not given

Total cost = $= \frac{A}{EOQ} \times O + \frac{EOQ}{2} \times C$

g. Re-order point = (Safety stock + (Average usage × LT) – GIT

h. Average usage $= \frac{\text{Annual requirement}}{\text{Days in year or week}}$

Receivable Management

- The term receivable is defined as debt owned to the firm by customers arising from the credit sales of goods or services in the ordinary course of business. When a firm makes an ordinary sales of goods or services and does not receive payment, the firm is granting trade credit and creates account receivable which could be collected in the future.
- This credit is known as receivable. It is also called book debts. The objective of receivable management is to promote sales and profits until that point is reached where the return on investment in further funding receivable is less than cost of funds raised to finance that additional credit i.e. cost of capital.

Elements of Credit Policy

- Credit period
- Cash discount
- Credit standard
  - (i) The five Cs systems.
    - Character
    - Capacity
    - Collateral
    - Capital
    - Condition
  - (ii) Credit scoring system
- **Collection policy**

Monitoring the credit policy

- Day sales outstanding
- Aging schedule

Day sales outstanding

The period within which the credit amount is collected after the day of sales is called DSO or average collection period. DSO is calculated using following equation:

$$DSO = \frac{\text{A/c receivable} \times 360 \text{ days}}{\text{Sales}}$$

After DSO is calculated DSO and credit period are compared. If DSO and credit period are very near then credit policy is said to be effectively operating and vice versa. This fact is shown by following example.

Firm	X	Y
Credit sales (Rs.)	5000,000	8000,000
Average account receivables	430,000	10,00,000
Credit terms	3/15, net 30	3/20, net 30

$$\text{DSO (Firm X)} = \frac{\text{A/c receivable} \times 360 \text{ days}}{\text{Sales}} = \frac{\text{Rs.}430000 \times 360 \text{ days}}{\text{Rs.}5000000} = 30.96 \text{ days or } 31 \text{ days}$$

$$\text{DSO (Firm Y)} = \frac{\text{A/c receivable} \times 360 \text{ days}}{\text{Sales}} = \frac{\text{Rs.}1000000 \times 360 \text{ days}}{\text{Rs.}8000000} = 45 \text{ days}$$

When DSO and credit period are compared the credit policy of firm X is seen more effective the credit period (30 days) and DSO (31 days) are almost similar. The receivable management of firm Y is not effective because of the difference of DSO and credit period.

Aging schedule

The method of dividing the credit amount/ receivable into different time periods showing that what percentage of credit is collected within what period of time is called aging schedule. In others word; it is a report showing how long accounts receivable have been outstanding. The report divides receivables into specified periods, which provides information about the proportion of receivables that are current and the proportion that are past due for given lengths of time. If the aging schedule shows that more of credit is collected at the initial period and slowly the rate goes on decreasing at later periods then it will show the stronger aspect of credit policy and vice-versa. The following example is shown to make this clear.

Age of A/R (days)	Firm X		Firm Y	
	Outstanding receivables (Rs)	% of total amount (Rs)	Outstanding receivables (Rs)	% of total amount (Rs)
0 – 30	500,000	50%	200,000	18.18%
31 – 45	200,000	20	300,000	27.27
46 – 60	150,000	15	200,000	18.18
61 – 90	100,000	10	300,000	27.27
Over 90	50,000	5	100,000	9
Total	1000,000	100	1100,000	100

The above aging schedule shows that the 50% of total credit of term X is collected within the first month and remaining 50% of total credit is collected within 45 days whereas in firm Y 18.18% of total credit is collected within the just month. The credit of firm X is only 20% after 2 months whereas it is 27.27% for firm Y. This fact shows that the credit policy of X is effective whereas the credit policy of Y needs re-thinking. In this way DSO and aging schedule help to show the implementation of credit policy, which helps to improve and monitor the credit policy.

DSO = % of customer taking discount $\times$ discount period + % of customer not taking discount $\times$ Net period + % of customer paying late $\times$ total late period

Rautahat Rice company sells on terms of net 30. Total sales for the year are Rs.912500. Forty percent of the customer pay on the 10^{th} day and take discount: the other 60% pay on average, 40 days after their purchases.

- What is the day's sale outstanding?
- What is the average amount of receivables?
- What would happen to average receivable if company tough end up on its collection policy with the result that all non-discount customers paid on the 30^{th} day.

Given;

Credit terms = 3/10 Net 30

Sales = Rs.912,500

Discount taking customer = 40%

Non-Discount taking customer = 60% pay 10 day later that late period 40days.

(a) Day sales outstanding (DSO)

DSO = % of DTC × DP + % of paying late × late period

$= 0.40 \times 10 + 0.60 \times 40 = 28$ days

(b) Account receivable $= \frac{\text{DSO} \times \text{Sales}}{365 \text{ days}} = \frac{28 \times \text{Rs.}912500}{365 \text{ days}} = \text{Rs.}70{,}000$

(c) If non-discount customer pay in net period 30 days

DSO = % of DTC × DP + % of NDT × NP $= 0.40 \times 10 + 0.60 \times 30 = 22$ days

Receivable $= \frac{\text{DSO} \times \text{Sales}}{365 \text{ days}} = \frac{22 \times \text{Rs.}912500}{365 \text{ days}} = \text{Rs.}55{,}000$

If the credit term is tightened receivable amount decreases from is Rs.70,000 to Rs.55,000.