CHAPTER NO. 10 : SECURITY ANALYSIS & PORTFOLIO MANAGEMENT

Points to be discussed :

→ Introduction

→ Investment v/s speculation

→ Returns of a security

→ Risk of a security

→ Theory of Dominance

→ Co-efficient of variation

→ Types of Risks

→ Returns of a portfolio

→ Risk of a portfolio

- Co-variance
- Co-efficient of correlation
- Calculation of portfolio Risk

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- → Reduction of Risk through diversification
- → Markowitz model of Risk return optimization
- → Portfolio Beta, security Beta & Alpha
- → Capital Asset Pricing Model
- → Undervaluation & overvaluation of stocks
- → SML and CML
- → Sharpe's optimum portfolio
- → Approaches to valuation of a security
  - Fundamental Approach
  - Technical Approach

→ Introduction

↑ Risk → ↑ Returns
↓ Risk → ↓ Returns

} Risk Return Trade off.

→ Investment v/s Speculation

Investments	Speculation
• Properly planned.	• Random investment based on estimates
• ↓ Risk ↓ Returns	• ↑ Risk ↑ Returns
• Long term	• Short term
• Behaviour of investor conservative & cautious	• Behaviour of investor careless & daring

→ Returns of a security

Formula No. 1 :

$$R = \left[\frac{(P_1 - P_0) + D_1}{P_0}\right] \times 100$$ where

R = Returns of a security

P_1 = Market price at end of Year 1

P_0 = Market price at present

D_1 = Dividend at end of year 1.

Formula No.'s 2 and 3 :

When probabilities are NOT GIVEN

$$\bar{x} = \frac{\Sigma x}{n}$$ Where —

$\bar{x}$ = Expected Return

When probabilities are GIVEN

$$\bar{x} = \Sigma p.x$$ Where —

$\bar{x}$ = Expected Return

x = Returns of securities

x = Returns of securities

p = probabilities.

n = Total no. of years

→ Risk of a security

Standard deviation is a measure of Total Risk of a security

Risk is the deviation from the actuals.

Standard deviation is the deviation of each return from its mean

It is a positive square root of variance

Calculation of variance and standard deviation

When probabilities are NOT GIVEN

$$\sigma = \sqrt{v}$$

$$v = \frac{\Sigma(x-\bar{x})^2}{n}$$

Where —

σ = standard deviation

When probabilities are GIVEN

$$\sigma = \sqrt{v}$$

$$v = \Sigma\, p \cdot (x-\bar{x})^2$$

Where —

σ = standard deviation

v = variance

x = Returns of security

$\bar{x}$: Average Return

n = No. of years.

v = variance

x = Returns of security

$\bar{x}$ = Average Return

p = Probability

→ Theory of Dominance

A security is said to dominate the other if —

(i) It gives HIGHER Returns at the SAME level of Risk OR

(ii) It gives LOWER Risk at the SAME level of Returns OR

(iii) It gives HIGHER Returns at a LOWER level of Risk

Examples

	(i) Risk	(i) Returns	(ii) Risk	(ii) Returns	(iii) Risk	(iii) Returns
Security A	10%	16% ✓	9%	12%	7% ✓	13%
Security B	10%	13%	✓ 7%	12%	10%	12%

→ Co-efficient of variation

It is a simple Risk – Return Ratio.

It shows the value of Risk taken per unit of Return

Therefore, securities having a lower CV, are preferred

Formula: $CV = \frac{\text{Risk}}{\text{Return}}$

→ Types of Risks

Systematic Risk

- Risk affecting ALL the securities in the market
- caused because of MACRO Economic Factors
- NON DIVERSIFIABLE Risk

Unsystematic Risk

- Risk affecting a PARTICULAR SECURITY in the market
- caused because of MICRO Economic Factors
- DIVERSIFIABLE Risk

→ Returns of a portfolio

Returns of a portfolio is the weighted average return of all the securities in the portfolio

Formula : $R_p = W_A R_A + W_B R_B + \ldots\ldots\ldots + W_n R_n$ where —

W = weight of the security

R = Returns of the security

Example :

Security	Investment	Returns
A	0.30	16%
B	0.70	20%

$R_p = W_A R_A + W_B R_B$

$= (0.3 \times 16) + (0.70 \times 20) = 4.8 + 14$

$R_p = 18.80\%$

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→ Risk of a portfolio

- **co-variance**

Relates the rate of returns between two securities

Covariance ranges from $-\infty$ to $+\infty$

Shows the directional relationship between two securities.

+ ve covariance → securities move in same direction

− ve covariance → securities move in opposite direction

Calculation of covariance

When probabilities are NOT GIVEN

$$COV_{xy} = \frac{\Sigma (x-\bar{x})(y-\bar{y})}{n}$$

Where —

When probabilities are GIVEN

$$COV_{xy} = \Sigma p \cdot (x-\bar{x})(y-\bar{y})$$

Where —

x and y = Returns of two securities
$\bar{x}$ and $\bar{y}$ = Average Returns
n = No. of Years
p = probabilities

- <u>coefficient of correlation</u>

shows the extent of change i.e if one security returns change by $x\%$, by how much will the returns of other security change

coefficient of correlation ranges from -1 to $+1$

-1 : perfect negative correlation
0 : No correlation
$+1$: Perfect positive correlation

<u>Formula</u> :

$$r_{xy} = \frac{COV_{xy}}{\sigma_x \cdot \sigma_y}$$

where —

r_{xy} = coefficient of correlation

COV_{xy} = covariance of securities x & y

σ = standard deviation

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- **Calculation of Portfolio Risk**

Formula :

$$\sigma_p = \sqrt{W_A^2 \cdot \sigma_A^2 + W_B^2 \cdot \sigma_B^2 + 2 \cdot W_A \cdot W_B \cdot \sigma_A \cdot \sigma_B \cdot r_{AB}}$$

Where — σ_p = Portfolio Risk

W = Weights of securities

σ = Risk of securities

r_{AB} = co-efficient of correlation

→ **Reduction of Risk through Diversification**

Combining more than one security in the portfolio is called as diversification.

The main purpose of diversification is to reduce the Total Risk.

securities with ...

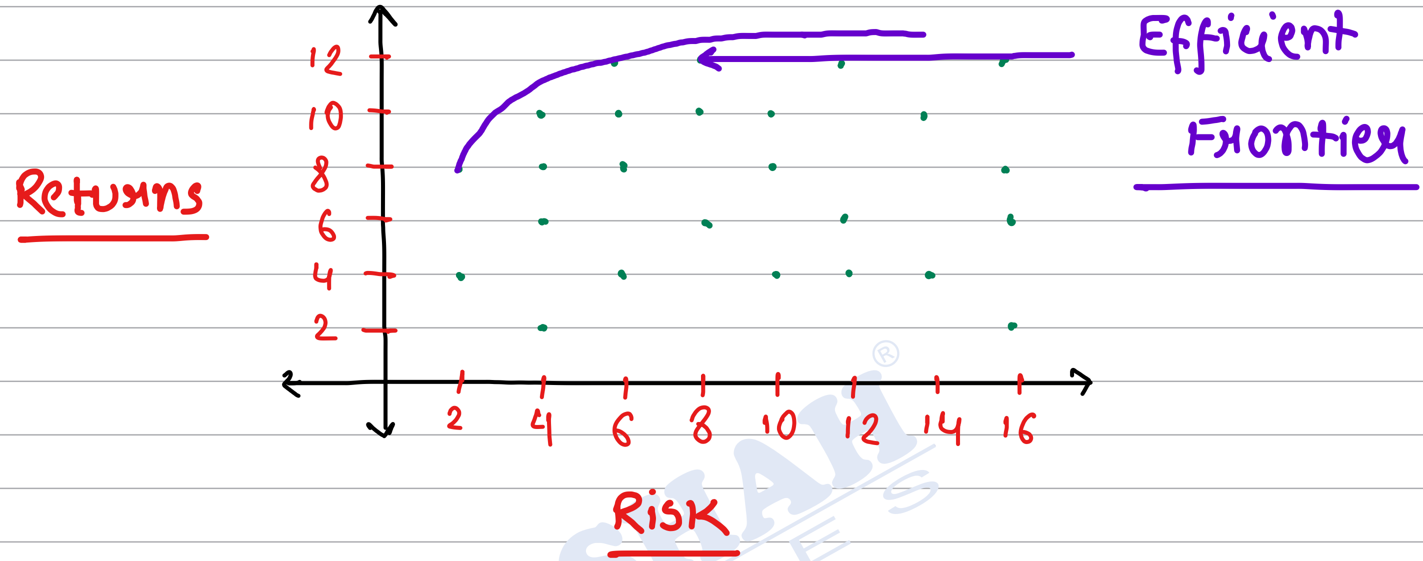
Perfect positive correlation	Risk cannot be reduced
No correlation	Risk reduction is possible
Perfect Negative correlation	Risk reduction is faster

→ **Markowitz Model of Risk Return optimization**

According to this theory, An efficient portfolio is the one which —

- Gives HIGHER returns at a particular level of Risk or
- Bears LOWER risk at a particular level of Returns

Based on the Risk - return preferences an investor shall select the securities lying on the Efficient Frontier.



→ Portfolio Beta, security Beta & Alpha

Beta is a measure of systematic Risk

Beta shows the change in the security with respect to a change in the market.

Formula : Beta of a security = $\frac{\sigma_x}{\sigma_m} \times r_{xm}$ Where —

σ_x = standard deviation of security x

σ_m = standard deviation of market

r_{xm} = coefficient correlation of security x with the market

Beta of a portfolio is the weighted average of the Beta of all the securities in the portfolio.

Formula: Beta of a portfolio = $W_A \beta_A + W_B \beta_B + \ldots\ldots + W_n \beta_n$

where — W = weight of the security

β = Beta of the security

Alpha

Alpha is the excess return provided by a security over and above its expected return.

Formula: Alpha = Actual Returns − Expected Returns

$\downarrow$

CAPM Returns

→ Capital Asset Pricing Model [CAPM]

The CAPM is used to calculate the expected return of a security

Formula: $K_e = R_f + (R_m - R_f)\beta$ where —

K_e = Cost of Equity capital

R_f = Risk free Rate of Return

R_m = Market rate of return

$R_m - R_f$ = Market Risk premium

β : Sensitivity with market (Beta)

→ Undervaluation and overvaluation of stocks

CAPM can be practically used to Buy, sell or Hold stocks.

If —

CAPM Return < E(R) : Buy → Stock is undervalued

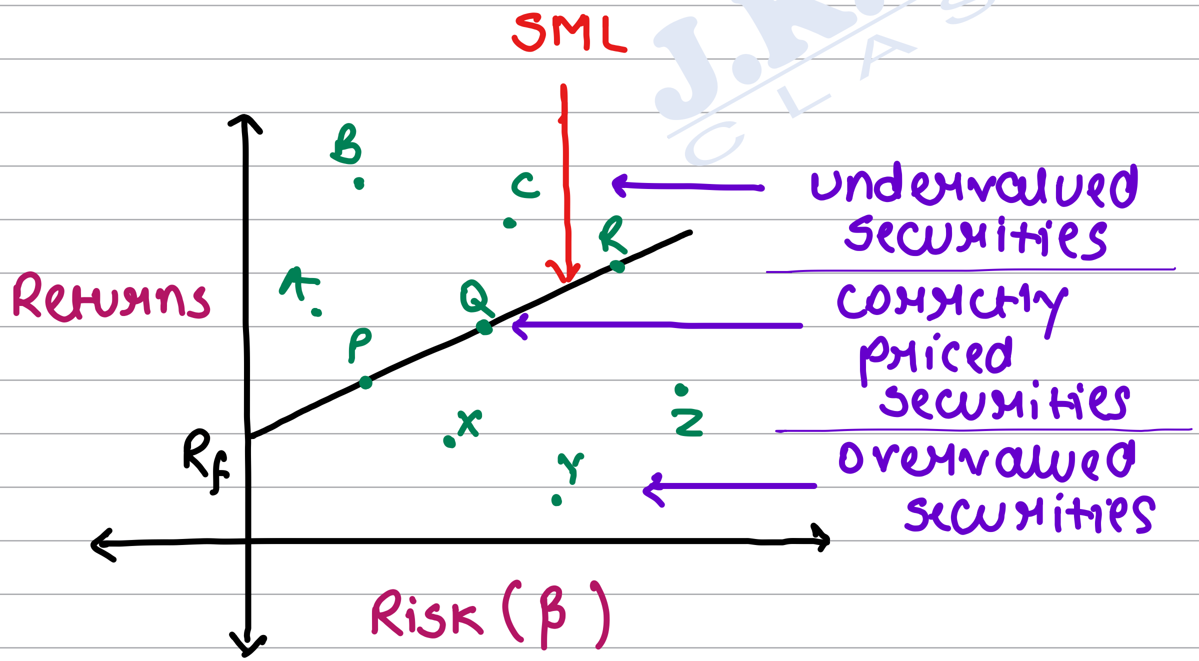
CAPM Return > E(R) : Sell → Stock is overvalued

CAPM Return = E(R) : Hold → Stock is correctly valued

E(R) → What it actually gives

CAPM Return → What it should give

→ Securities Market Line [SML] & Capital Market Line [CML]



SML considers β as a measure of Risk whereas CML considers σ as a measure of Risk.

→ Sharpe's optimal portfolio

This theory is also called as Sharpe's single index Model.

The selection of stocks, as per this model, is considered by calculating Excess return to Risk ratio, which is calculated as follows —

$$= \frac{E(R) - R_f}{\beta}$$

where —

$E(R)$ = Return of a security

R_f = Risk free rate

β = sensitivity of stock with respect to the market i.e the Beta.

→ Approaches to valuation of a security

- Fundamental Approach
- Technical Approach

The Fundamental Approach

- According to this approach, every stock has an intrinsic value.
- This intrinsic value is the present value of all the future cash inflows from that security, discounted at an appropriate rate.
- This intrinsic value can be used to buy, sell or hold securities by comparing it with the market price
- If, intrinsic value > Market price : Buy

  intrinsic value < Market price : Sell

  intrinsic value = Market price : Hold

- Intrinsic value is calculated as follows:

Fixed income bearing securities → Discounting Future cash inflows at an appropriate discount rate

Securities with no Fixed income → Using Gordon's Formula

The Technical Approach

According to this approach, market price of securities are determined on the basis of demand and supply equilibrium under technical approach, the market prices of securities can be determined by Technical charts & Technical indicators

An analysis of the past trend of the stock can help an investor to estimate the movement of the stock

upward movement → Bullish trend

Downward movement → Bearish trend

Dow Jones Theory

According to this theory stock movements can be classified as —

- **Primary Movements**
  Basic trend of market
- **Secondary Movements**
  A break in the basic trend
- **Daily Fluctuations**
  Daily up and down movements

—— x —— x —— x —— x —— x —— x ——