

Risk & Return

Risk and Return

1. Risk and Return of a Single Asset
2. Risk and Return of a Portfolio

Risk and Return of a Single Asset

Rate of Return

The rate of return on an asset for a given period is defined as follows

Annual Income + End price – Beginning Price

Rate of return = $\frac{\text{Annual Income + End price – Beginning Price}}{\text{Beginning Price}}$

Risk

The variability of the actual return from the expected returns associated with a given asset/investment is defined as risk. The greater the variability, the riskier the security (e.g. shares) is said to be. The more certain the return from an asset (e.g. T-bills), the less variability and, therefore, the less the risk.

Probability Distribution

Based on the probability distribution of the rate of return, you can compute two key parameters, the **expected rate of return** and the **standard deviation of rate of return**.

Expected Rate of Return

The Expected rate of return is the weighted average of all possible returns multiplied by their respective probabilities.

$$E(R) = \sum_{i=1}^n P_i R_i$$

Where E(R) = Expected return

R_i = Return for the i th possible outcome

p_i = probability associated with R_i

n = number of possible outcomes

Standard Deviation of Return

The variance of a probability is the sum of the squares of the deviations of actual returns from the expected return, weighted by the associated probabilities.

$$\sigma^2 = \sum P_i (R_i - E(R))^2$$

Where

σ^2 = Variance

R_i = Return for the i th possible outcome

P_i = Probability associated with the i th possible outcome

R = Expected Return

RISK AND RETURN OF PORTFOLIO

A portfolio means a combination of two or more securities (assets). A large number of portfolios can be formed from a given set of assets.

Expected Return on a portfolio

The expected return on a portfolio is simply the weighted average of the expected returns on the assets comprising the portfolio. For example, When a portfolio consists of two securities, its expected return.

$$E(R_p) = X_1 E(R_1) + (1-X_1) E(R_2)$$

Where :

$E(R_p)$ = Expected return on a portfolio

X_1 = Proportion of portfolio invested security 1

$E(R_1)$ = Expected return on security 1

$(1-X_1)$ = Proportion of portfolio invested in security 2

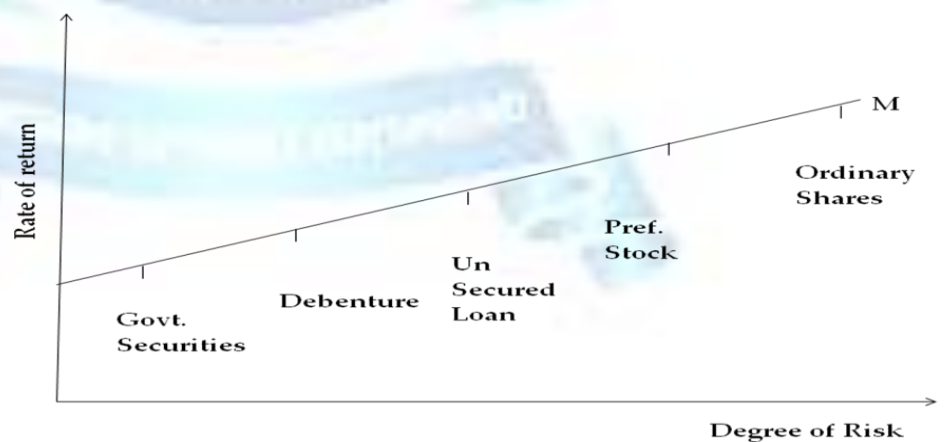
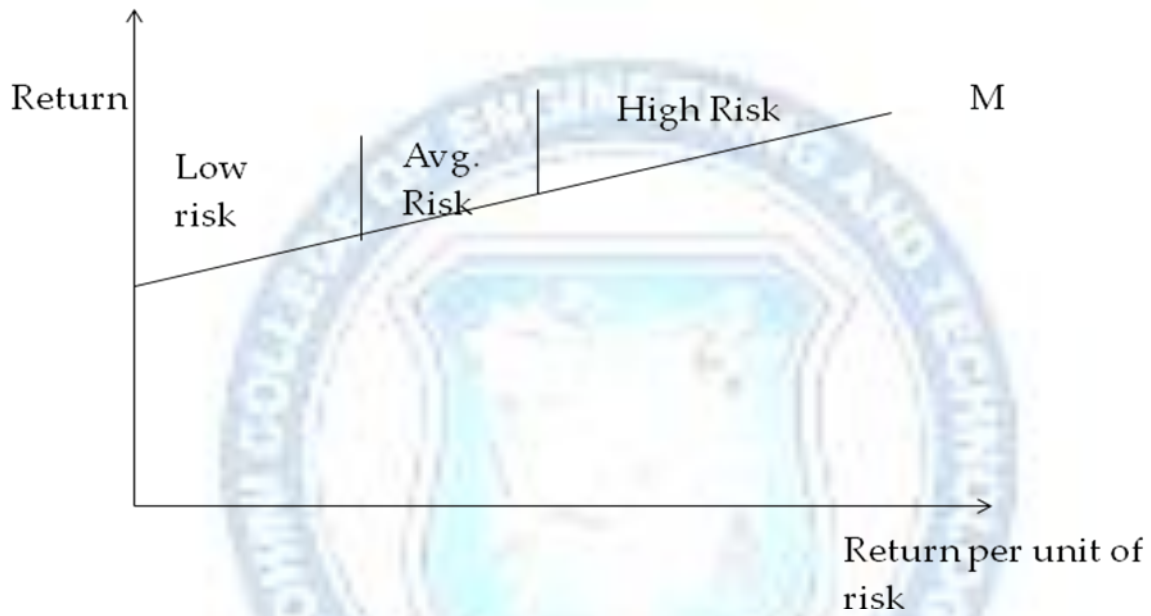
$E(R_2)$ = Expected return on security 2

In general, when a portfolio consists of n securities, the expected return on the portfolio is

$$E(R_p) = \sum x_i R_i$$

RISK – RETURN CONCEPT

- Investment with higher risk should produce higher return
- Low levels of risk are associated with low potential return



Risks in Investment

