

## Unit 4 Risk and Return Theory

### Write short notes on:

#### a. Return

Motivation of investment is return. The return is different between terminal wealth (which investor receives) and initial wealth (which investor sacrifices).

Different forms of return:

1. Rupee return = Terminal Wealth-Initial Wealth =  $P_1+D_1-P_0$  ; where,  $P_1$ =Final Value of Wealth,  $D_1$ = Income received during the period,  $P_0$  = Initial value of wealth.
2. Holding Period Return (HPR) = The period during which investor own an investment is called its holding period and the return for that period is the holding period return.  $HPR = \frac{\text{Terminal value of wealth} - \text{Initial value of wealth}}{\text{Initial value of wealth}}$ .
3. Average rate of Return ( $\bar{K}$ ): Average return from given historical returns of any assets. ( $\bar{K}$ )  

$$= \frac{K_1+K_2+K_3+\dots}{n}$$
; K=historical return, n=no of observation.
4. Expected rate of return is the return which is expected by the investor before making investment decision. *Expected Return*  $E(\bar{r}) = \sum_{j=1}^n r_j \times p_j$ ;

#### b. Total Risk

Total risk of any security or portfolio is measured by standard deviation. Risk is defined as the deviation between the actual return and the expected return. In another word, it is uncertainty of return and if there is certainty there is no risk at all. It is measured by the variability of returns. Variance and standard deviation are the important tools to measure the risk in absolute basis whereas coefficient of variation (C.V.) measures the risk on relative basis.

#### c. Security Market Line (SML)

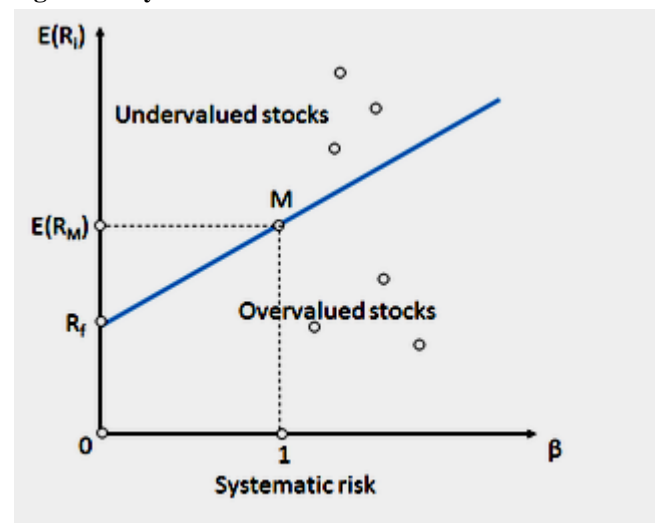
**Security market line (SML)** is the representation of the Capital asset pricing model. It displays the expected rate of return of an individual security as a function of systematic, non-diversifiable risk measured by beta ( $\beta$ ).

The Y-intercept of the SML is equal to the risk-free interest rate. The slope of the SML is equal to the market risk premium and reflects the risk return trade off at a given time:

$$E(R_i) = R_f + [E(R_M) - R_f] \times \beta_i$$

Where,  $E(R_i)$  is an expected return on security,  $E(R_M)$  is an expected return on market portfolio M,  $\beta_i$  is beta risk,  $R_f$  is a risk-free rate

Fig: Security market line



#### d. Unsystematic Risk

*Unsystematic risk*, also known as *diversifiable risk* or *firm related risk* is the type of uncertainty that comes with the company or industry we invest in. Unsystematic risk can be reduced through diversification. For example, news that is specific to a small number of stocks, such as a sudden strike by the employees of a company we have shares in, is considered to be unsystematic risk.

#### e. Systematic Risk

*Systematic risk*, also known as *market risk* or *un-diversifiable risk*, is the uncertainty inherent to the entire market or entire market segment. Interest rates, recession and wars all represent sources of systematic risk because they affect the entire market and cannot be avoided through diversification.

#### f. Beta Risk

*Beta* is an index of systematic risk. It measures the sensitivity of a stock's return on the market portfolio. Thus beta of any security is the relative measures of the risk which tells us about how risky a particular security in comparison to average securities in the market is. Beta of market portfolio is considered to be 1 as a base. Any security whose beta exceeds 1 is riskier than market. Therefore required rate of return of such security is greater than market return. Such security is termed as aggressive security. On the other hand, any security whose beta is less than 1, is less risky than market. Therefore, required rate of return of such security is less than market return. Such security is termed as defensive security. Beta coefficient of stock 'i' can be calculated as,

$$\beta_i = \frac{COV(i,m)}{\sigma_m^2} \quad \text{Where, } COV(i,m) = \text{Covariance between the return of security } i \text{ \& market,}$$

$\sigma_m^2$  = variance of market return,

#### g. Portfolio

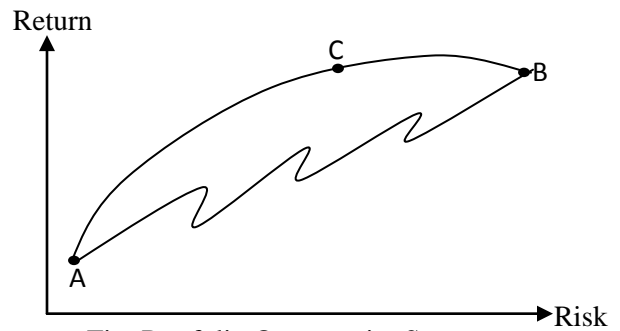
A group of investments held by an investor. For example, if an investor owns shares in Nabil, Unilever, and bonds in LIC, one collectively refers to these as the investor's portfolio. Rational investors are expected to seek the highest possible return at the lowest possible risk. They do this by creating diversified portfolios, which spread risk out among several investments.

#### h. Diversification

Diversification is a process of combining securities in a portfolio. The aim of diversification is to reduce total risk without sacrificing portfolio return. It is risk management technique. The more the number of assets is portfolio; the more will be reduction of risk of portfolio. The benefits of diversification will hold only if the securities in the portfolio are negatively correlated. However lower degree of positive correlation also provide diversification benefit to some extent.

### i. Portfolio Opportunity Set or Feasible Set

Given a set of assets, the total number of portfolios that can be constructed at different levels of risk and expected returns. The portfolio opportunity set helps an investor construct a portfolio with the assets he/she has at his/her risk tolerance. In figure, ABC is a set of portfolios formed by numbers of stocks risk and return combinations



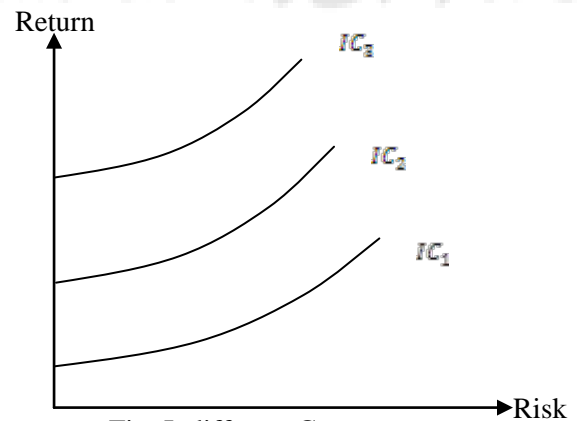
### j. Efficient Frontier

A set of optimal portfolios that offers the highest expected return for a defined level of risk or the lowest risk for a given level of expected return. Portfolios that lie below the efficient frontier are sub-optimal, because they do not provide enough return for the level of risk. Portfolios that cluster to the right of the efficient frontier are also sub-optimal, because they have a higher level of risk for the defined rate of return. In above figure of portfolio opportunity set, portfolio lies in AC frontier are most optimal and called efficient frontier.

### k. Indifferent Curves

Indifferent curves represent an investor's preferences for risk and return. The horizontal axis usually indicates risk as measured by standard deviation and the vertical axis indicates reward as measured by expected return in graph. This definition gives us the following properties, assuming we have a rational investor:

- All portfolios that lie on the same indifference curve are equally desirable to the investor (even though they have different expected returns and risk.) An obvious implication is that indifference curves do not intersect.
- An investor will find any portfolio that is lying on an indifference curve that is above to be more desirable than any portfolio lying on an indifference curve that is below.



Generally it is assumed that investors are *risk averse*, which means that the investor will choose the portfolio with the smaller risk given the same return. These two assumptions of non-satiation and risk aversion cause indifference curves to be positively sloped and convex.