Department of Commerce
University of Calcutta

Study Material

Cum

Lecture Notes

Paper: DSE.306A: Security Analysis and Portfolio Management (SAPM)

Only for the Students of M.Com. (Semester III)-2020

University of Calcutta

(Internal Circulation)

M.Com Semester III 2020

Security Analysis and Portfolio Management

Paper DSE 306A

Module I (Security Analysis)

Dr. Bikram Singh

The students are requested to go through the study material so that they can have a better understanding of the topics and follow the lectures better. The material provided is not exhaustive in nature. The topics will be explained in detail during the lecture sessions. More study materials will be provided as the class progresses.

1. The concept of investment and portfolio of investment

Investment is a sacrifice of money or other resources to have some future economic benefits. This very concept clearly comes out with two key areas. The investment has to be made at a specific time, say now which is almost certain but the benefits are to be obtained in the future which are likely to be uncertain. Therefore, investments decisions are subject to the elements of time and risk. It may be mentioned that the attributes of time and risk varies from investment to investment. For e.g., in case of investment in government securities time is the important element on which investors are likely to decide because we normally assume that government securities are risk free. In case of investments in equity shares both time and risk are very important attributes. Again when we make investments in stock options, risk becomes the most dominant element. A portfolio is a collection of securities. Portfolio of investment means investments in number of available investment alternatives such as government securities, bank deposits, debentures, equity shares, mutual funds, life insurance, real estate, precious objects, financial derivatives, etc. Portfolio analysis considers the determination of future risk and return in holding various blends of individual securities.

2. Investment Evaluation

An investor before making a financial investment needs to evaluate the security in which the investment is being made. There are a number of criteria on the basis of which an investor can evaluate the security such as return, risk, marketability, tax benefits and convenience.

3. Security Analysis: Approaches

There are broadly two approaches to analyse securities. They are fundamental analysis and technical analysis. In fundamental analysis the objective is to appraise the ‘intrinsic value’ of the security. The intrinsic value is then compared to the market price of the security to understand whether the particular security is underpriced or overpriced. If the market price is

more than the intrinsic value then the security is overpriced or overvalued and vice-versa. The thumb rule for investment is that investors invest in underpriced or undervalued securities. In technical analysis the internal market data is used to predict the future stock price movement. This market generated information is used to make charts and graphs to help take decisions to buy, sell or hold the security.

4. Fundamental Analysis

In order to find the intrinsic value or true economic worth of a financial asset fundamental analysts take a three step approach. Firstly the macro economic factors are analysed. Secondly, the prospect of the industry, to which the firm in which the investor is going to consider for investment, is analysed. Finally, the firm in which the investor wants to invest is analysed for finding out the intrinsic value of the security. In simple terms, the fundamentalists attempt to estimate the true value of a security by considering the earning potential of a firm, which in turn will depend on the prospects of the industry in which the firm belongs. Since all firms exist within the macroeconomic environment the analysis of the environment becomes necessary. Fundamental analysis is also termed as E-I-C analysis i.e., economy, industry and company analysis.

5. Macro Economic Analysis

In order to understand the state of the macro economy it is necessary to study the key variables. The variables includes the rate of growth of a country's GDP, industrial growth rate, the agricultural output, the level of savings and investments in the economy, the government budget, the level of government debt, inflation and price level, the prevailing interest rates, the country's balance of payment, forex reserves, exchange rate, foreign investment, infrastructural facilities and consumer sentiments. It should be understood that the change in the variables can create a favourable investment environment or otherwise. An analyst needs to understand the impact of the key variables on the economy before taking any investment decision. For e.g. if it is forecasted that the growth rate of the economy is going to go down in the future meaning economic contraction, an investor should understand that this is most likely to have an adverse impact on the performance of the firms within an industry. As investments involve sacrifices made today with an expectation towards future economic benefits every investor needs to evaluate the macroeconomic factors which are likely to affect the future industry and company environment.

6. Industry Analysis

Industry analysis aims at understanding the prospects of different industries. A proper industry analysis helps an investor to understand the impact of macroeconomic factors on the

industry and the expected industry performance. The industry analysis includes understanding the structure and characteristics of the industry, the industry life cycle, and the sensitivity of the industry to business cycles.

7. Company Analysis

A favourable macroeconomic and industry environment can provide opportunities to the firms within an industry to enhance performance. However, it depends on the capability of individual firms on how they capitalise the opportunity created. Therefore, it becomes necessary to analyse the firms within an industry to choose the best performing or the most prospective firm for investment. This measurement of firm's performance is called company analysis. Moreover, this analysis helps a prospective investor to decide whether the firm's security is overpriced or underpriced. There are many techniques in measuring firm performance and the most common one is ratio analysis. Key financial metrics are used by financial analysts to understand the firm's earnings level, dividend level, growth, risk, etc. The use of valuation multiples such as price to book value ratio (P/BV ratio), price to sales ratio (P/S ratio), price to earnings ratio (P/E ratio), enterprise value (EV) to earnings before interest, taxes, depreciation and amortisation (EBITDA), *q* ratio (Market value of equity and liabilities to estimated replacement cost of assets) provides meaningful insights on the firm's financial health.

8. Estimation of Intrinsic Value of the Share

In order to find out the intrinsic value of the share it is necessary to estimate the firm's expected earnings per share (EPS) followed by an appropriate PE ratio of the firm. The intrinsic value is the product of the firm's expected EPS and the appropriate PE ratio. It is important to note that this procedure gives us a single point estimate of the firm's intrinsic value. But it is often difficult for an investor to take decision on investment just based on single point estimate. This necessitates defining the value range around the single point estimate.

9. Important Indicators to measure Financial Performance

i. Return on Equity (ROE) = Equity earnings (PAT-Preference dividend)/ Shareholders' fund

Factors affecting the Return on Equity using the DuPont Analysis

- ROE = PAT/Sales (Net Profit Margin) * Sales/Assets (Asset turnover) * Assets/Equity (Equity Multiplier)

Decomposing ROE into five factors

ROE =PBIT/Sales * Sales/Assets * PBT/PBIT * PAT/PBT * Assets/ Equity

(PBIT efficiency) (Asset turnover) (Interest Burden Ratio) (Tax Burden ratio) (Equity Multiplier)

ii. Book Value per share = Shareholders' Fund/ Number of outstanding equity shares

iii. Earnings per share (EPS) = Equity earnings (PAT – Preference dividend)/Number of outstanding equity shares

iv. Dividend payout ratio (DP ratio) = Distributed equity earnings / Total equity earnings

v. Retention Ratio = 1- DP ratio = Retained Earnings/ Total equity earnings

vi. P/E ratio = Market price per share/Earnings per share

- P/E ratio (Prospective) also called Forward PE ratio = MPS at the beginning of the year 'n'/ EPS for the year 'n'
- P/E ratio (retrospective) = MPS at the end of the year 'n'/ EPS for the year 'n'

vii. Sustainable growth Rate (g) = ROE * Retention ratio

viii. P/BV Ratio = Market price per share/ Book Value per share

- P/BV (prospective) = MPS at the beginning of the year 'n'/ BV per share for the year 'n'
- P/BV (retrospective) = MPS at the end of the year 'n'/ BV per share for the year 'n'

ix. Volatility of ROE = Range of ROE over 'n' years/ Average ROE over 'n' years

M.COM. [SEMESTER III]
UNIVERSITY OF CALCUTTA

Paper DSE 306A: SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

MODULE II : PORTFOLIO MANAGEMENT

PART – 1

Prepared by:

Prof. Dr. Tanupa Chakraborty
Professor
Department of Commerce
University of Calcutta

2020

Learning Objectives

The objectives of this second module on 'Portfolio Management' of this paper are to:

- conceptualize 'investment'
- explore broad categories of investible assets
- understand the technicalities of investing in one investible asset especially share and then in different combinations of securities in a portfolio
- develop a mathematical approach towards formation of a portfolio
- understand the steps in portfolio management

References

- Prasanna Chandra, *Investment Analysis and Portfolio Management*, Tata McGraw Hill.
- Fischer and Jordan, *Security Analysis and Portfolio Management*, Pearson Education.
- Frank J. Fabozzi, *Investment Management*, Prentice Hall.

The study material on Module II of Paper DSE 306A shall be provided in three parts. Accordingly, this lecture note pertains to Part – 1 of the syllabus to be covered.

Basic idea about 'Investment'

'Investment' involves discretionary commitment of funds made in expectation of earning some future benefit or return so as to improve economic well being of investor i.e. to make one who invests richer. Such investor class is of two types – *Retail Investors* (i.e. individuals like us) and *Institutional Investors* (i.e. financial institutions like banks, insurance companies etc., mutual fund houses, brokerage houses, endowment funds, pension funds, foreign institutional investors etc. There are a number of investment avenues available for investment and they may be grouped as under –

- *Real Assets* – these are tangible in nature i.e. their physical properties determine their value; examples include real estate i.e. farm or urban / semi-urban land, and house property; precious objects like gold, silver, diamond and other precious metals and stones etc.
- *Financial Assets* – these are intangible paper-based or electronic assets representing legal claims to certain future cash flows; examples include bank / PF / PPF deposits, money market instruments like treasury bills, commercial paper, certificate of deposit etc., capital market instruments like shares, bonds etc., mutual fund schemes etc.

Of the above two classes, investing in financial assets is the obvious choice of any investor, be it retail or institutional one, as it requires much less capital for investment and also more liquid than real assets. So the focus of discussion in this paper will be on investment in financial assets, especially in shares of a company.

Unit 5: Portfolio Analysis

Basic Principle of Investment Decision Making

The primary motive of investment is to earn 'return' on the invested amount in future. But investments yielding attractive returns are not always favoured by the investors because of the 'risk' associated with them which is simply the possibility that the expected return will not materialize. There is an element of 'risk' in every kind of investment, in some cases it may be more and in some cases less. It is a known fact that 'the higher the return, usually the greater the risk involved'. It is also an established fact that investors, in general, not only like 'return', but they dislike 'risk'. So, investment decision making must aim at maximizing investors' expected return subject to their tolerance for risk i.e. it involves a trade-off between risk and return. Accordingly, understanding the concepts of 'return' and 'risk' is central to investment decision making.

Concept of 'Return'

Return is the principal reward in investment process and it is the key to comparing and evaluating investment alternatives i.e. securities.

Components of 'Return'

Return on a security consists of the following two components –

(a) *Income component* – it refers to periodic cash receipts on a security either in the form of interest or dividend. It may consist of one or more cash payments paid at specified intervals of time, as for example, dividend on equity shares may be received twice a year as interim and final dividend. Income for the year should in such a case include both interim and final dividend. Another distinguishing feature of this component of return is that it is always paid in cash by the issuer to the holder of the security.

(b) *Capital component* – it refers to the change in price of the security i.e. appreciation or depreciation over the holding period and is commonly referred to as capital gain or capital loss. If the end period price is greater than the beginning period price, then capital gain arises and capital loss arises when the opposite happens.

Thus total return on a security is the sum total of periodic income and price change. Income component of total return can be either positive or zero,

while capital component of total return on a security can be positive, zero or negative thereby making total return on a security as positive, negative or zero in nature.

Types of Return

There are two kinds of return – *ex post* return and *ex ante* return.

(i) *Ex post or Realized or Historical Return* – it is 'after-the-fact' return i.e. the return that was earned or that could have been earned on a security had the investor decided not to hold the security but to sell it off. Thus ex post return is historical in nature.

Measurement of ex post return

Ex post return on a security can be measured either for a single period or over multiple periods as follows.

Single period Ex post return

The single period ex post total return on a security can be measured as the sum of periodic income in relation to the beginning period price or purchase price of the security (commonly referred to as 'yield') and price change relative to the beginning period price or purchase price as follows.

$$\text{Single Period Ex post Total Return} = \text{Income Yield} + \text{Relative Price Change}$$

$$R_t = \frac{C_t}{P_{t-1}} + \frac{(P_t - P_{t-1})}{P_{t-1}}$$

Where C_t = cash payment received in the form of interest or dividend during period 't'

P_t = market price of the security at the end of period 't' or sale price of the security

P_{t-1} = market price of the security at the beginning of period 't' or at the end of previous period 't-1' or purchase price of the security

R_t = total return on the security measured in %

Even if an investor holds a security and does not sell it at the end of the period, the difference between end period price and beginning period price must be included in total return as unrealized capital gain or loss on the ground that investor could have sold the security and realized such capital gain or loss had he wished to do so.

Illustration (1)

- Market Price per Share as on 31.3.2019 = Rs. 200/-
- Market Price per Share as on 31.3.2020 = Rs. 220/-

- Dividend per Share for 2019-2020 = Rs. 2.50
  (comprising Rs. 1.50 per share as interim dividend declared and paid in July 2019, and the balance Re. 1.00 per share as final dividend)

Single Period Ex post Total Return for 19-20:

$$R_{19\text{-}20} = \frac{2.50}{200} + \frac{(220 - 200)}{200} = 11.25\%$$

❑ Case – 1
Investor purchased shares in August 2019 for Rs. 210/- per share

Single Period Ex post Total Return for 19-20:

$$R_{19\text{-}20} = \frac{1.00}{210} + \frac{(220 - 210)}{210} = 5.24\%$$

❑ Case – 2
Investor sold shares in January 2020 for Rs. 218/- per share

Single Period Ex post Total Return for 19-20:

$$R_{19\text{-}20} = \frac{1.50}{200} + \frac{(218 - 200)}{200} = 9.75\%$$

❑ Case – 3
Investor purchased shares in August 2019 for Rs. 210/- per share
Investor sold shares in January 2020 for Rs. 218/- per share

Single Period Ex post Total Return for 19-20:

$$R_{19\text{-}20} = \frac{0}{210} + \frac{(218 - 210)}{210} = 3.81\%$$

Multiple period Ex post return
Investors may hold the securities for periods longer than one year i.e. longer than a single period. Returns over such multiple periods can be measured either on a total basis, known as n-year holding period return, or some summary statistic or methods of averaging may be used that would summarize a series of various single period ex post total returns over multiple periods. The two most popular summary statistic or averaging methods are arithmetic mean and geometric mean.

(A) Methods of Averages

(1) Arithmetic Average Return

Also known as average rate of return or mean return, it is an easy-to-calculate summary statistic and is measured as the sum of the series of various single period ex post total returns over multiple periods divided by total number of periods as follows –

$$\bar{R} = [R_1 + R_2 + R_3 + R_4 + \ldots\ldots\ldots + R_n] \div n$$

or $$\bar{R} = (\Sigma^{n}_{i=1} R_i) \div n$$

Where R_i = total ex post return for i^{th} period
n = total number of periods
$\bar{R}$ = arithmetic average return

Arithmetic average return is appropriate as a measure of central tendency of a series of various single period ex post total returns over multiple periods i.e. it represents return for a single period on an average. However, the following two are the limitations of applying arithmetic mean as a measure of average return over multiple periods -

- ✓ it fails to reflect average compound rate of growth of one rupee of investment over multiple periods, and
- ✓ when any of the single period ex post return values become negative over time, arithmetic mean starts giving a misleading picture of average return over multiple periods.

In both the above situations, geometric mean provides a realistic measure of average return over multiple periods.

(2) Geometric Average Return

Also known as compound annual rate of return or time weighted rate of return, geometric average return measures compound, cumulative returns over time. Geometric average return calculation is based on the assumption that each year's return is reinvested in the security for the next year thereby yielding returns at a compound rate. Accordingly, geometric average return is calculated as n^{th} root of the product resulting from multiplying a series of return relatives minus one as follows -

$$GM = \sqrt[n]{[(1+R_1)\,(1+R_2)\,(1+R_3)\,(1+R_4)\ldots\ldots\ldots\,(1+R_n)]} - 1$$

$$= [(1+R_1)\,(1+R_2)\,(1+R_3)\,(1+R_4)\ldots\ldots\ldots\,(1+R_n)]^{1/n} - 1$$

Where R_i = total ex post return for i^{th} period (i=1,2,3,……n)
n = total number of periods
$\bar{R}$ = geometric average return

$(1+R_i)$ = Return Relative for i^{th} period i.e. Return Relative = (1+ Total Return). So even if total return is negative for a particular period, its return relative

can never be negative; at worst it can be zero. So by using return relatives in its calculation, geometric average return is able to eliminate the adverse effect of negative single period ex post total returns on average return over multiple periods.

(B) Return on Total Basis

If $R_1, R_2, R_3, \ldots\ldots R_n$ is the series of various single period ex post total returns over 'n' number of years, then n-year holding period return on a compound basis can be determined as follows –

n-year Holding Period Return = $[(1+R_1)\ (1+R_2)\ (1+R_3)\ (1+R_4)\ldots\ldots\ (1+R_n)] - 1$

Problem (1): An investor buys shares in X Ltd. in September 2015 against a public offer for Rs. 100 face value of shares at a premium of 120%. The market value per share at financial year end for each of the years from 2014-2015 to 2019-2020 are respectively Rs.240, Rs.250, Rs.270, Rs. 245, Rs.260 and Rs. 275. Dividend per share over 2014-2015 to 2019-2020 are Rs.3, Rs.4, Rs.2, Rs.2, Rs.1.50 and Rs.3 respectively. Besides, the company paid an interim dividend of Rs.1.50, Re. 1.00, Rs.1.50 and Re. 1.00 per share respectively in the month of August 2015, 2016, 2018 and 2019.
From the above information, determine the following over the investor's holding period –

(i) single period ex post total returns
(ii) arithmetic average return
(iii) 5-year holding period return
(iv) compound annual rate of return

Solution: Let C_t = Dividend per share (including interim dividend, if any) received during year 't'
P_t = Market Price per share at the end of year 't' or sale price per share
P_{t-1} = Market Price per share at the beginning of year 't' i.e. at the end of previous year 't-1' or purchase price per share

(i) We know that single period ex post total return for a particular period 't' (R_t) can be determined as follows –

$$R_t = \text{Dividend Yield} + \text{Capital Return}$$
$$= \frac{C_t}{P_{t-1}} + \frac{(P_t - P_{t-1})}{P_{t-1}}$$

Statement showing Single period Ex post Total Returns over the period 2015-2016 to 2019-2020

Financial Year (t) (1)	Market Price per share at financial year end (Rs.) (P_t) (2)	Dividend per share (Rs.)			Dividend Yield ($C_t \div P_{t-1}$) (%) (4)	Capital Return [($P_t - P_{t-1}$) $\div P_{t-1}$] (%) (5)	Total Return (R_t) (%) (6 = 4+5)
		Interim Dividend (A)	Final Dividend (B)	Total Dividend (Ct) (3=A+B)			
2014-2015	240	-	3.00	-	-	-	-
2015-2016	250*	1.50	4.00	4.00**	(4/220*) x 100 = 1.82	{(250-220*)/220*} x 100 = 13.64	15.46
2016-2017	270	1.00	2.00	3.00	(3/250) x 100 = 1.20	{(270-250)/250} x 100 = 8.00	9.20
2017-2018	245	-	2.00	2.00	(2/270) x 100 = 0.74	{(245-270)/270} x 100 = (-)9.26	(-)8.52
2018-2019	260	1.50	1.50	3.00	(3/245) x 100 = 1.22	{(260-245)/245} x 100 = 6.12	7.34
2019-2020	275	1.00	3.00	4.00	(4/260) x 100 = 1.54	{(275-260)/260} x 100 = 5.77	7.31

*Investor purchased shares in September 2015 for Rs.220 per share (Rs.100 face value + 120% premium thereon). So P_{t-1} for 2015-2016 is considered as the purchase price – Rs.220/-, and not the beginning period price as on 1.4.2015 (31.3.2015 price) i.e. Rs.240/-.

** Since the investor purchased shares in September 2015, while interim dividend of Rs.1.50 per share has been declared and paid in August 2015, the investor had not been entitled to interim dividend and had received only final dividend of Rs.4.00 per share for FY 2015-16.

(ii) Arithmetic Average Return

$$\overline{R} = (\Sigma^{n}_{t=1} R_t) \div n$$

{where n = number of years in holding period = 5}

$$= \frac{15.46 + 9.20 + (-)8.52 + 7.34 + 7.31}{5} = 6.16\%$$

(iii)

Year	2015-16	2016-17	2017-18	2018-19	2019-20
Total Return (R_t)	0.1546	0.092	(-)0.0852	0.0734	0.0731
Return Relative (1+ R_t)	1.1546	1.092	0.9148	1.0734	1.0731

5-year Holding Period Return = $[(1+R_1)\ (1+R_2)\ (1+R_3)\ (1+R_4)\ (1+R_5)] - 1$
= [1.1546 x 1.092 x 0.9148 x 1.0734 x 1.0731] – 1
= 1.329 – 1 = 0.0329 i.e. 32.9%

(iv) Compound annual rate of return i.e. Geometric Average Return =
$[(1+R_1)\ (1+R_2)\ (1+R_3)\ (1+R_4)(1+R_5)]^{1/5} - 1$
$= [1.329]^{1/5} - 1$
= 1.059 – 1 = 0.059 i.e.5.9%

Concept of 'Real Return'

Returns as calculated above represent nominal or absolute money returns i.e. returns without considering purchasing power of money. So nominal returns can be converted into real return after adjusting for the effect of inflation as follows.

$$\text{Real Return} = \frac{[1 + \text{Nominal Return}]}{[1 + \text{Inflation Rate}]} - 1$$

(ii) *Ex ante or Expected Return* – it represents the return from a security that the investors anticipate they would earn over some future period i.e. it is a predicted or forecasted return. The expected single period rate of return from a security is the weighted average of all possible return outcomes where the weights are the respective probabilities associated with the occurrence of return outcomes and is calculated as follows –

$$E(R) = R_1P_1 + R_2P_2 + R_3P_3 + R_4P_4 + \ldots\ldots\ldots + R_nP_n$$
$$= \left(\Sigma^{n}_{i=1}\ R_i\ P_i \right) \div n$$

where R_i = return outcome under economic state 'i'
P_i = probability associated with occurrence of i^{th} return outcome
n = total number of return outcomes / economic states / observations
E(R) = expected single period rate of return from a security

The calculation of expected rate of return from a security is based on estimation of all possible return outcomes. Since return from a security is composed of two components – income and price change, various company and industry wide factors need to be considered to estimate both these components for the future period under all possible economic states such as

high growth, expansion, stagnation, recession etc. Such estimates shall then be used to calculate all possible return outcomes using the single period return formula for the future period. Thereafter, the chance or likelihood or probability of occurrence of each return outcome is determined based on subjective judgment and past experience of the investor. Finally, each return outcome is multiplied by its respective probability and the results are added to obtain the expected rate of return from the security.

Concept of 'Risk'

While taking investment decisions investors must realize that the expected return may or may not materialize because the estimates of income and price change on which the calculation of expected return is based may not materialize as expected. This means that an investor should not only find out whether the expected return from a security is adequate or not, but should also measure the degree of uncertainty associated with the expected return. This leads to the concept of 'risk' of investment in a security which refers to the possibility that the realized return may vary from the expected return on a security. So, there is a need to quantify such risk for taking investment decisions appropriately.

Measurement of 'Risk'

Risk of investment in a security can be measured in terms of variability or dispersion of individual return outcomes from expected return. The two most commonly used measures of risk involved in individual securities are variance and standard deviation.

Measuring Risk of Expected Return
The risk associated with expected return from a security for a particular period can be measured by variance and standard deviation, where variance is calculated as the sum of the squares of deviations of individual return outcomes from expected return, with each weighted by the associated probabilities as follows –

$$\text{Variance } (\sigma^2) = \Sigma^{n}_{i=1} [P_i \{R_i - E(R)\}^2]$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\Sigma^{n}_{i=1} [P_i \{R_i - E(R)\}^2]}$$

where R_i = i^{th} return outcome
P_i = probability associated with i^{th} return outcome
n = total number of return outcomes / economic states
E(R) = expected return from a security

The above measures of total risk involved in a particular security are regarded as 'surrogate' or 'proxy' for risk because other measures of dispersion can also be used to quantify such risk. In general, the higher the

standard deviation or variance, the greater the risk involved in a security and vice versa.

Measuring Historical Risk

Although investment decision making involves determining risk of expected return, risk of historical return series earned over multiple periods can be measured in terms of the extent of deviation or dispersion of individual single period rates of historical return from arithmetic average rate of return as follows –

$$\text{Variance } (\sigma^2) = \frac{1}{n-1} \Sigma^{n}_{i=1} (R_i - \overline{R})^2$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{1}{n-1} \Sigma^{n}_{i=1} (R_i - \overline{R})^2}$$

where R_i = total ex post return for i^{th} period
$\overline{R}$ = arithmetic average rate of return = $(\Sigma^{n}_{i=1} R_i) \div n$
n = total number of periods

Selection of a Security for Investment

Investment decision making should not only involve estimating expected return and risk of each investment alternative, but such risk return estimates must be matched with the investors' attitude towards risk. This means that an individual investor would always want to know whether the amount of perceived risk associated with an investment is worth taking in order to get the expected return (question of investor's risk attitude / preference arises here), and whether a higher return is possible for the same level of risk, or a lower risk is possible for the same level of return.

But it is not possible to specify a generally acceptable level of risk for all investors because of the differences in their risk preferences. Based on their attitude towards risk, investors can be classified into the following three risk classes –

(a) Risk Averse investors – those who avoid taking greater risk;

(b) Risk Neutral investors – those who are unaffected by the level of risk associated with an investment, and

(c) Risk Seeking investors – those who like taking additional risk in anticipation of earning higher return.

Accordingly, given the choice of a number of investment alternatives, investment decision making by the above three classes of investors will be as follows.

i. If investment alternatives are such that they are likely to yield equal rates of return, then investors of all risk classes will rationally select the alternative with the lowest risk.

ii. If investment alternatives are such that they have equal risk, then investors of all risk classes will rationally select the alternative with the highest expected return.
iii. If risk-return estimates vary among investment alternatives, then the following two situations may arise –
    a) If risk-return relationship is inverse among investment alternatives, then investors of all risk classes will rationally select the alternative with the highest expected return and lowest risk.
    b) If risk-return relationship is direct among investment alternatives, then –
        - a risk averse investor will select the alternative with lowest risk even though he may earn a lower expected return as a result;
        - a risk neutral investor, who does not consider risk while taking investment decisions, will select the alternative with highest expected return, and
        - a risk seeking investor will select the alternative with highest return and risk.

It may be noted that the amount of extra return required by an investor for an increase in risk will depend upon the risk class to which the investor belongs i.e. the extent to which investor trades risk for return i.e. a kind of degree of risk aversion. A risk averse investor, with a greater degree of risk aversion, would want a higher return as compensation for an increase in risk than a risk seeking investor with a lower degree of risk aversion. Also, investors in general are risk averse i.e. they prefer investments with lower standard deviation or risk to those yielding higher rates of return but have a higher risk associated with it.

Types of Risk

The total risk of a security as measured by standard deviation or variance can be divided into two components – systematic risk and unsystematic risk as follows.

i. Systematic or Market Related or Non-Diversifiable Risk

It refers to that portion of total variability in a security's returns caused by factors which are external to a particular firm but affect the prices of securities of all firms. This means that the effect of such factors is to cause the prices of all securities to move together in the same manner. There are three kinds of sources of systematic risk which can be classified as market risk, interest rate risk and purchasing power risk. *Market risk* may be caused by investors' reaction to tangible as well as intangible events. Tangible real events which may give rise to market risk can be either *economic* (e.g. economic recession, devaluation of home currency, oil shortage, food crisis etc.) or *political* (e.g. political turmoil, threat of war, assassination of politician etc.) or *social* (e.g. social unrest, outbreak of epidemic etc.) in nature. Intangible events are

related to market psychology. It refers to an exaggerated response to some unfavourable economic, social or political real event. As for example, when a real event like economic recession, threat of war, social unrest etc. triggers off the initial decline in stock market, dampened spirits may grip the fear of loss among other investors too, and hence generate a kind of herd instinct (i.e. tendency to go with the crowd and only 'buy' or only 'sell' at the same time) among other investors thereby driving them to make an exit from the stock market. This will create an excessive selling pressure in the stock market pushing the stock prices further down. *Inter*est *rate risk* arises due to fluctuations in market interest rate caused by changes in government's monetary policy, while *purchasing power risk* i.e. loss of purchasing power of money is caused by inflation in the economy. It may be noted that stock price changes are inversely related to fluctuations in both interest rate and inflation. Since the above-mentioned factors are pervasive in their effect i.e. as they affect the prices of securities of all firms to a greater or lesser degree, the risk originating from such factors is known as systematic risk. Moreover, as these factors are external to a particular firm or industry, they are unavoidable and hence cannot be eliminated by way of portfolio construction and diversification. Hence this kind of risk is also known as non-diversifiable risk. A security's beta coefficient measures the level of systematic risk possessed by a security. Since an investor cannot eliminate this kind of risk by portfolio formation, he would want compensation for this risk bearing and, as a result, a security's beta coefficient is used in calculation of expected return from a security through Capital Asset Pricing Model.

ii. *Unsystematic or Unique or Firm / Company Specific or Diversifiable or Residual Risk*

It refers to that portion of total variability in a security's returns caused by factors which are unique or specific or peculiar to a particular firm or industry. As these factors primarily affect the specific firm and / or industry, and not all firms in general, the risk originating from such factors is known as unsystematic risk. There are two kinds of sources of systematic risk which can be classified as business risk and financial risk. *Business risk* arises due to changes in operating environment of the firm which can be either internal or external in nature. *Internal business risk* arises due to factors such as managerial inefficiency, labour trouble, high turnover of key personnel, cut in R&D spending etc. and hence is largely associated with the efficiency with which a firm conducts its operations within its broader operating environment. *External business risk* is the result of operating conditions imposed upon the firm by circumstances beyond its control. Such factors may include downswing in business cycle, changes in government's policy resulting into imposition of higher tariff, import / export restrictions, price / volume control etc. directed at a particular firm or industry. *Financial risk* arises due to the presence of debt or borrowed capital in the capital structure of the firm because debt financing increases the variability of returns to

equity holders and hence adversely affects their return expectations and increases their risk perception. A firm with no debt financing has no financial risk. Thus financial risk is avoidable as the management has the freedom to decide on the extent of financing by debt or equity. Since this kind of risk is unique to a particular firm or industry, they can be eliminated by an investor if a large number of securities are combined to form a well diversified portfolio such that the unique risk of a particular security may be cancelled by complementary firm specific risk in other securities. Hence this kind of risk is known as diversifiable risk. Also, as a portion of individual security risk is caused by common set of systematic risk factors, what remains as residue in individual security risk is caused by uncommon set of unsystematic risk factors and hence unsystematic risk is also known as residual risk.

The next part of the study material will deal with the remaining portions of Unit 5 on the motivation for and the mathematics behind portfolio formation, and the subsequent units of syllabus for Module II of the subject.