MC 07 : FINANCIAL MANAGEMENT

UNIT-4 : RISK AND RETURN

The objectives of this unit are to:

- examine the concepts of Risk and Return
- understand the different types of Risk
- discuss the techniques available for measuring risk
- analyse the relationship between Risk and Return

STRUCTURE

4.1 INTRODUCTION

The whole gamut of financial decision making centres around the trade-off between risk and return. Decision making of any kind involves both positive and negative aspects. A Farmer tills the land, sows the seeds with an expectation of better yield. Till the crop is ripe and he actually reaps the harvest, he rarely knows whether his expectations have come true. In between expectation and reality, there is the interplay of many variables. Continuing the example of the farmer, there are key variables such as weather, seeds, fertilisers, farm management techniques that make the expectations turn into reality. There

is the possibility of adverse happening in any of the variables widening the gap between the expectation and reality. The analogy applies equally to a company, to an investment manager and every individual or institution that is faced with a decision making situation.

4.2 CONCEPT OF RISK

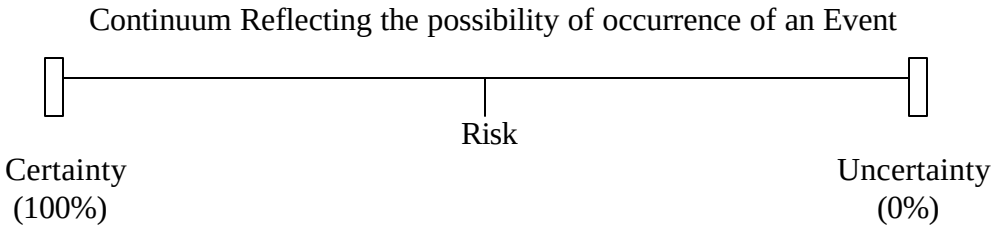
Risk may be understood as the possibility of adverse happening. We consider those situations as risky, if they involve larger deviations from the expectations. Whether a particular situation involves risk or not depends on with what precision we can estimate the possibility of occurrence of a particular event. This gives raise to the following three states of possibilities:

A. Certainty
B. Uncertainty
C. Risk

Certainty is a situation reflecting the happening of a particular event as expected with zero deviation. In case of certain 'All Truths', there will be no deviation. Like the sun rising in the east and inevitability of death. Similarly, there may be some business situations involving near certainty. Expecting to sell a certain number of bags of rice in a locality, when you are a monopolitist and rice is the staple food of the people of the locality.

Uncertainty is a situation that makes prediction difficult. One may not be sure of the occurrence of a particular event with any degree of precision. People find it often difficult to make predictions pertaining to weather. So also, the meteorological department, sometimes. To attempt to define uncertainty with any rigor presents extremely complex and hazardous conceptual and mathematical problems. In practice also, it is difficult to deal with the situations of uncertainty, since nothing stands to prediction.

The third state of possibility, i.e., risk, is said to be a situation lying in between the above two states, viz., certainty and uncertainty. This can be best understood in the form of a continuum with certainty and uncertainty on the two ends and risk covering the middle ground.



In statistical terminology, Risk is referred to be a situation in which future outcomes, together with their associated probabilities are known. In other words, it is said to be as dispersion in a subjective probability distribution.

As a matter of fact, a businessman can face confidently, the situation of risk only. There will be no difficulty in making decisions under the situation of certainty; and he will not be precise with any amount of sophistication of tools under uncertainty. Therefore, what can a manager reasonably perform are the situations of risk only. The theory of finance, therefore, realises the significance of risk in final decision-making.

Ex-ante and Ex-Post Risk: Risk, as a concept, has both ex-ante and ex-post meaning. Ex-ante risk refers to a decision variable reflecting the probability of realising unfavourable outcomes in the future as a result of a decision made currently. Ex post risk refers to observed variation in outcomes during prior periods. This risk is historical. The estimation and evaluation of future outcomes, based on current information, is the most difficult exercise involved in financial decision making. Finance literature considers the ex ante concept of risk as having greater value than the ex-post concept of risk, since it is the former that a finance manager confronts.

4.3 CONCEPT OF RETURN

Return is something received back. In the field of financial decision making the manager invests the company's money on diverse fixed and current assets and hopes to receive something back on his investment. This can be said to be the meaning of return. Nevertheless, the term 'return' has several dimensions, as of the following:

(i) Book Vs. Market Return
(ii) Single period Vs. Multi period Return
(iii) Ex-ante (expected) Vs. Ex post (Realised) Return
(iv) Security Vs. Portfolio Return

Book Vs. Market Return: Book return is the return calculated from the books of the company using profits and assets. Normally, the return on assets (ROA) is taken as the indicator of book return. Several other return calculations can also be made using other variables like capital employed, networth, capital invested, earnings per share and dividends per share. In all these cases, these returns reflect historical performance. Whereas, market return is based on the market values of the assets. Suppose, X buys the stock of ABC company for Rs.100, whose face value is Rs.10/- and the company earning Rs.1 per share, his book return is 10%; while his market return is 1 per cent.

Single period Vs. Multi period Return: Return is always computed with reference to a particular period. If an investment of Rs.100 earns an income of Rs.3 over a three month period, the rate of return is 3 per cent. If another investment earns an income of Rs.3 over a 12-month period, then also the return is 3 per cent. But the measures appear to be illogical, unless they are related to a specific time period. Normally, rates of return are computed on an annual basis. As such, the rates of return of the above two investments would be 12 per cent and 3 per cent respectively.

Return on investment will be earned during a calendar interval, which may or may not be the same as the time period used to specify the rate of return. Investors would be normally curious to know, what rate of return they were able to make, irrespective whether they made it during the calendar interval or otherwise. As such, the following analogy may be resorted to compute the return on an asset for a specific holding period.

Return on investment is the excess, cash flow generated form an investment. If Co is the amount, our investment to buy an asset, at the beginning of the period, and C_1 is the amount that can be recovered through its sale, return on investment (R) in absolute terms can be specified as:

$$R = C_1 - Co \quad -- \quad -- \quad -- \quad (1)$$

If we want it in relative terms, (i.e. in per cent or otherwise) ‘r’ can be computed as:

$$r = \frac{R}{Co} = \frac{C_1 - Co}{Co} \quad -- \quad -- \quad (2)$$

Total return for a given holding period can also be derived using the following equation:

$$1 + r = \frac{C_1}{Co} \quad -- \quad -- \quad (3)$$

Normally, total return on a given asset comprises of the following two components:

(i) Income received on the asset for the holding period; and

(ii) Value received at the end of the holding period. This may be due to sale or maturity.

Given the above, equation (3) can be rewritten as:

$$1 + r = \frac{D_1 + C_1}{Co}$$

$$\therefore \quad r = \frac{D_1 + C_1}{Co} \quad -- \quad 1$$

Suppose, an investor purchased the common stock of ABC company for Rs.100 and held it for three years. After three years, he sold it for Rs.125 and in the meantime, he received Rs.20 as dividends for three years. His total return (r) would be:

$$r = \frac{20 + 125}{100} \quad -- \quad 1$$

$$= \frac{145}{100} \quad -- \quad 1$$

$$= 0.45 = 45\%$$

Now this is a return for the entire holding period of three years. Normally, investors are interested in knowing annual return. The same can be arrived at using the following equation:

$$r = \sqrt[T]{(1+r_1)\ (1 + r_2)\ - - - -\ (1 + r_T)} \quad - \ 1$$

For the given example, return can be as follows:

$$r = \sqrt[3]{1 + 1.45} - 1$$

$$r = 1.3481 - 1$$

$$= 34.81\%$$

Sometimes, returns are compounded on a half yearly or quarterly basis. In that case, yield can be described in one of several ways depending on whether or not the return period is redefined.

When return relatives are compounded 'm' times per year for 'n' number of years, effective annual yield can be derived thus:

$$(1 + r) = \left(1 + \frac{r}{m}\right)^{mn}$$

Where 'm' is the number of times compounded and 'n' is the number of years.

For example, a yearly return of 8 per cent on an investment of Rs.100 implies a terminal value of Rs.108.00. If the return is compounded twice in a year (means if income is received half yearly), the terminal value becomes Rs.108.16;

Since $TVn = Xo \left(1 + \frac{r}{m}\right)^{mn}$

$$= 100 \left(1 + \frac{.08}{2}\right)^{2}$$

$$= 108.16$$

If the same is compounded on quarterly basis, terminal value becomes Rs.108.24;

$$= 100 \left(1 + \frac{.08}{4}\right)^{4}$$

$$= 108.24$$

The terminal value at the end of 3 years, for example with quarterly compounding becomes Rs. 126.82. Anyhow, one need not so much worry about these calculations. For, there are interest tables available for this purpose.

Ex-ante Vs. Export Return

Ex-ante means **before the fact**, whereas ex-post means after the fact. There is significant difference in these two, as far as security returns are concerned. An ex-ante return is the one that an investor hopes to get from his investment. There is no guarantee that what the investor has hoped for would come true. Whereas, the ex post return is the actual or realised return. In the event of bullish or bearish conditions prevailing in the markets, the gap between the expected return and actual return may be very wide. The following are the simple formulae for computing both the returns.

$$\text{ex ante Return} = \frac{\text{Anticipated dividend + anticipated end price}}{\text{initial investment}}$$

$$\text{ex post return} = \frac{\text{actual dividend received + actual market price}}{\text{initial investment}}$$

Security Vs. Porfolio return

This is with reference to the investment in a single asset/security against a group of assets/securities. Whatever be the security, whether it is debentures, preference shares or equities, the procedure for valuation can be common. Nevertheless, in case of the valuation of equities, authors in finance have proposed certain valuation models based on dividends or earnings.

The general formula applied to find out the current market price of a stock is:

$$P_o = \frac{D_o(1+g)^1}{(1+r)^1} + \frac{D_o(1+g)^2}{(1+r)^2} + \text{- - - - -} + \frac{D_o(1+g)^\alpha}{(1+r)^\alpha}$$

$$\text{Where } r = \frac{D_1}{P_o} + g$$

While this model can be used in case of a single stock, the return of a portfolio can be deduced by summing up the weighted average of the returns of the individual stocks. The weights are nothing but the percentage of total investment made in each stock.

Thus $r_p = \sum_{t=1}^{n} x_i \quad r_i$

Where r_p = return in portfolio
x_i = proportion of funds invested in security 'i'
r_i = return on security 'i'
n = number of securities in the portfolio

4.4 TYPES OF RISK

The total risk of an asset is said to comprise of the following two risks:

1. Systematic Risk
2. Unsystematic Risk

Systematic Risk

We are aware that variation in the returns is caused by various controllable and uncontrollable factors. Systematic risk refers to that portion of total variability in returns caused by factors external to the investor, such as changes in the economic, political and social conditions. The effect of these changes would be near uniform on the assets dealt in the market. It is common that when economic conditions are bright, indicating a steep growth in the GDP, falling inflation and rising incomes, the prices of the securities also go high reflecting the sentiments of the economy. Reverse occurs when the economy shows signs of recession. It has been held by Fisher and Jordan that firms with high systematic risk tend to be those whose sales, profits and share prices follow the level of economic activity and the level of the securities markets closely. These companies include most firms that deal in basic industrial goods and raw materials.

The individual components of systematic risk are the following:
(i) Market risk
(ii) Interest rate risk
(iii) Purchasing power risk

Market Risk

This is the major part of the systematic risk, keeping in view of the changes in the external factors, investors also change their expectations as to the returns that could be generated by their investments. Sometimes, the price of a stock may fluctuate widely even

though its earnings remain unchanged. This is mainly due to the changes in the attitudes of the investors. Also, changes in the expectations may be caused by the influence of the returns of other securities. Not only its own earnings, but the earnings of other securities in the market may cause variations in the expectations of the investors. Therefore, market risk can be referred to as a phenomenon of variations in the expectations of the investor in respect of his investment, either due to changes in the return produced/anticipated from his investment or that produced/anticipated from investments by other investors. Market risk is a reaction of the investor to security returns and prices of his own and others.

What causes market to fluctuate is the question for which answer is still evasive. There is an interplay of real and unreal or imaginary events at market place. Market risk is usually touched off by a reaction to real events, but the emotional instability of investors acting collectively leads to a snowballing over reaction. The initial decline in the market can cause the fear of loss among the investors and then investors start selling their securities as if they have a **herd instinct**. Similar would be the tendency when the market is in boom. These over-reactions of the investors sometimes cause **crashes** in the markets. They also blind the players with a deep shock leading to scams in the market. The scam occurred in the Indian stock market during 1991 can be said to have been triggered mainly by the over reaction of the investors leading to a 'buying spree'.

Interest Rate Risk

This refers to the uncertainty of future market values and of the size of future income, caused by fluctuations in the general level of interest rates. The root cause of this risk lies in the fact that the general rates of interest in the market are not static. They would be varying depending the supply of and demand for money. Even in those countries (like India) where there is regulated market, the interest rates are not static. These fluctuations in the general rates of interest cause variations in the expectations of the investors.

In general, the demand for money comes from the following three constituents of the economy:

(i) Household sector
(ii) Corporate sector
(iii) Government sector (including its public undertakings)

Of the above, households are generally takers of the market rates. As such, the interest rate structure is dependent on the size of demand coming from the other two sectors. If the demand from these two is more, naturally interest rates shoot up. Demand for money from the corporate sector is shot up due to favourable business conditions in the economy. Whereas, demand for money from the Government sector arises due to its policy of deficit funding. Increased borrowing from the market by government would be possible only when the potential buyers of the securities of the Government are induced to buy only at higher rates of interest. When once, the yield on Government securities rises, corporates are also forced to follow the government in offering a higher return to their investors. Lest, they should suffer for want of adequate supply of funds. As a matter of fact, yield on government securities is taken as a 'Floor rate' by investors to form their expectations on corporate investment. Since the investment in government securities is considered 'risk free', investors seek a higher compensation for their investment in corporate securities, as they involve higher risk.

Irrespective of the degree of regulation exercised by the Government and monetary authorities, interest rates prevailing in an economy form into a 'rational structure' (of course, in short periods, the structure may appear to be irrational; but it connects itself over a long period). The direct effect of increases in the level of interest is to cause security prices to fall across a wide span of investment vehicles. Similarly, falling interest rates precipitate price mark ups on outstanding securities.

In addition to the above, lower or higher interest rates make the purchase of securities with borrowed funds more or less attractive. Higher interest rates may lead to lower security prices, because of a diminished demand for equities by speculators. Further, many firms finance their operations with borrowed funds. Financial institutions help in the process of borrowing money. As interest rates advance, firms with heavy doses of borrowed capital find that more of their income goes toward paying interest on borrowed money. This may lead to lower earnings, dividends and share prices. As such, firms are required to be vigilant over the structure of interest rates prevailing in an economy.

Purchasing Power Risk

This risk refers to the impact of inflation or deflation on an investment. It is common that prices of goods and services are fluctuating due to variations in the supply of and demand for the same. In case of goods, fluctuations in their supply are caused due to vagaries of the nature. Supply of services may be affected due to lack of availability of skilled natural persons, changes in their intellectual capacities and attitudes.

Because of the imbalances in the supply of and demand for the goods and services, their prices may be fluctuating, leading to either inflation or deflation. General risk in prices is seen as inflation; while general decline in prices is understood as deflation. Purchasing power risk includes with these phenomena.

Generally, purchasing-power risk has come to be identified with inflation (rising prices); the incidence of declining prices in most countries has been slight. The most widely recognized sources of inflation are rising costs of production and exess demand for goods and services relative to their supply. In the vocabulary of economics, these types of inflation are called *cost-push* and *demand-pull*.

Demand-pull inflation is traceable to unfilled demand when the economy is at a full-employment level of operations. At this level, supply cannot be readily increased in the short run until the labor force or production expands. With demand high and increasing, available goods and services are allocated by price increases that bring supply and demand into equilibrium by forcing out some of the demand.

Cost-push inflation stems from increasing costs of production. As raw material and wage costs rise, producers attempt to pass along these increased costs through higher prices. In an environment where many labor contracts are up for renewal and workers feel their wages are lagging in comparison to prices, a spiral can be set off--wage increases followed by price increases, and so on.

The implication of the purchasing power risk is that the investors have to provide for an allowance for the unexpected changes in prices. Inflation is said to be under control in many developed and developing economies. But even these low levels of inflation have

significance in times of low interest rates. For example, the yield on Government securities in India is around 6 per cent. Inflation is around 5 per cent. Then, the real rate of return is only 1 per cent.

4.5 MEASURES OF RISK

Since risk is variability in the expectations, there are many statistical tools that can be employed to measure risk. The following are the usual statistical techniques that are relied upon.

1. Standard Deviation (SD)
2. Variance (V)
3. Coefficient of Variation (CV)
4. Skewness (Sk)
5. Probability Distribution

Standard deviation (σ): SD provides a measure of the spread of the probability distribution. The larger the SD, the greater would be the dispersion of the distribution. This is denoted by the symbol (σ) sigma. This is commonly used to measure variability in a given distribution. The following equation is used to find out the value of SD:

$$a = \sqrt{\frac{\Sigma (x - \bar{x})^2}{N}} \text{ ; or}$$

$$a = \sqrt{\frac{\Sigma fx^2}{N} - \left(\frac{\Sigma fx^2}{N}\right)^2}$$

Where x is the variable under consideration

$(x - \bar{x})^2$ is the square of deviations from the mean of x

'f' is the frequency distribution

In order to understand the significance of SD, let us take a simple example. Let us assume that we have invested in two stocks, A & B. The following are the returns generated by them in a period of five years:

Years	1	2	3	4	5
A (%)	30	28	34	32	31
B (%)	26	13	48	11	57

The average return produced by the above two investments is 31%. Whereas the SD of returns is quite significant. SD for A is 2% and SD for B is 18.5%. This implies that investment on stock A is less riskier than investment in stock B. Perhaps, we may also tend to conclude that investment in B is nine times riskier than investment in A.

Variance (σ^2): The square of SD is called variance. This measures the dispersion around the mean.

Co-efficient of Variation (CV): This is yet another frequently used measure of variation.

$$CV = \frac{\sigma}{\bar{x}} \times 100$$

The interpretation of this measure is that the lesser the variation in data, the more consistant it is.

Skewness (Sk): Skewness tells us about the symmetry of the data. Sometimes, a given data of two distributions may produce same mean and the same standard deviation. But the data may differ in terms of the shape of distribution. If a given data are not symmetrical, it is called asymmetrical or skewed. Higher skewness implies higher dispersion. In skewness, there are two possibilities, of data being: (i) positively skewed and; (ii) negatively skewed. Positive skewness implies that there is less likelihood of returns being lower than the mean. Whereas, negative skewness implies higher deviations from the mean. Therefore, positive skewness is considered less risky.

Probability Distribution: Probability distribution is a measure of someone's opinion about the likelihood that an event will occur. In other words, a probability distribution is a statement of the different potential outcomes for an uncertain variable together with the probability of each potential outcome. Typically, probability distributions of returns are estimated using actual historical data. By studying the behaviour of stock returns over the recent past, it is possible to come up with a subjective probability assessment for future

returns. While assessing risks and returns related to an investment, the expected return from an investment is taken as the average of return from the investment and is calculated as the probability weighted sum of all potential returns. Thus:

$$E(R) = \Sigma [P(r) \times r]$$

Where: E (R) = Expected return

P (r) = Probability of a particular value of return
r = return
Σ = sum of all possible outcomes

As per the above equation, each potential return be multiplied by its probability occurrence and then all these products are to be added together.

Example: Computation of Expected Return of Stock 'X'.

Return (%)	**Probability**	**Return X Probability (%)**
40	0.3	12
0	0.5	0
-20	0.2	-4
Expected Return =		+ 8

Expected Return = 40 x 0.3 + 0 x 0.5 + -20 x .2 = +8

4.6 RISK-RETURN RELATIONSHIPS

Though the literature on Finance has recognized the relationship between risk and return since the early nineteen hundreds, and made these relationships as the *sine die* of the financial decision making, their precise direction was not known till, the contribution of capital asset pricing model. This model has attempted to outline the nature of exact relationships that may previal between risk and return.

4.6.1 Capital Asset Pricing Model (CAPM)

The following two articles written by William F. Sharpe and John Lintner provided the basic concept of the CAPM.

1. **W.F. Sharpe:** Capital Asset Prices – A Theory of Market Equilibrium under conditions of risk, *Journal of Finance*, Vol.19, September, 1969, pp.425-42.

2. **John Lintner:** The Valuation of Risk Assets and the Selection of Risky Investments in Stock portfolios and Capital Budgets, *Review of Economics and Statistics*, Vol.47, February, 1965, pp.13-37.

According to CAPM, there is an implied equilibrium relationship between risk and return for each security. Under the conditions of market equilibrium, a security is expected to provide a return commensurate with its unavoidable risk. The greater the unavoidable risk of a security, the greater the return that investors will expect from the security. The relationship between the expected return and unavoidable risk and the valuation of securities is the essence of CAPM. Stated in other words, "the risk averse investors will not hold risky assets, unless they are adequately compensated for the risks, they bear".

Assumptions of the Model: The following are the important assumptions of the model.

1. Investors make their decisions only on the basis of the expected return, risk associated with the security.
2. An individual investor cannot influence the price of a stock in the market.
3. Investors can lend or borrow funds at the riskless rate of interest.
4. Assets are infinitely divisible.
5. There are no transaction costs involved on buying and selling of stocks.
6. There is no personal income Tax. It implies that the investor is indifferent between capital gain and dividend.

The Model:

According to CAPM, the expected return on asset 'N', is related to the risk of the asset (β_i) as follows:

$$E(R_i) = R_f + \beta_i \ [E(R_m)-Rf]$$

Where $E(R_i)$ = expected rate of return on asset 'i'.
R_f = risk free rate
β_i = beta co-efficient of stock 'i'
$E(R_m)$ = expected return of the market

This model believes that the expected rate of return of an asset has the following two components:

(i) Risk-free rate
(ii) Risk premium

The notation $\beta_i [E(R_m) – Rf]$ is the risk premium required for a given risk undertaken.

Whereas the beta of asset 'i' is computed as follows:

$$\beta_i = \frac{P_{im}\ \sigma_i\ \sigma_m}{\sigma_m^2}$$

Where P_{im} = Correlation co-efficient between the returns on the stock 'i' and the returns on the market portfolio

σi = Standard deviation of returns on asset 'i'

σ_m = Standard deviation of returns on the market portfolio

σ_m^2 = Variance of the market returns

Using CAPM to determine Stock Prices

One of the larger implications of the CAPM is that it can be used for pricing of the securities. It provides a framework for assessing whether a security is over-priced, under-priced or correctly priced.

In an efficient market, the price of an asset reflects its true cost. Basing on this, we can determine the over-pricing or under-pricing. Let us consider the following example:

Security	Estimated Returns (%)	Beta Co-efficient
A	30	1.6
B	24	1.4
C	18	1.2
D	15	0.9
E	15	1.1
F	12	0.7

Assume that the risk free rate is 10 per cent; while the market return is expected to be 18 per cent.

Using this data, pricing of the securities can be examined. Where:

$$E(R_i) = R_f + \beta_i [E(R_m) – Rf]$$

For security A : $E(R_A) = 10 + 1.6 (18-10)$
$= 10 + 12.8$
$= 22.8$ per cent

According to CAPM equation, the values for different securities will be as follows:

Security	Expected Return	Estimated Return
A	22.8	30
B	21.2	24
C	19.6	18
D	17.2	15
E	18.8	15
F	15.6	12

As per the above results, securities A and B provide more return and hence, they may be considered to be underpriced; whereas securities C D E and F provide less return compared to expected and hence may be deemed to be overpriced. Thus CAPM has an unique facility to decide stock prices.

4.6.2 Bower's Model of the Investment Decision Making Process

Bower provided an interesting model of the investment decision-making process. Let us briefly review it in this section.

Bower found that the investment process is typically initiated by a discrepancy between desired results and actual results with regard to a performance variable. For example, information from the production planning and control system might indicate that orders exceed or will soon exceed plant capacity, or perhaps, from the cost accounting system, information that unfavourable labour variances are appearing that seem to have their origin in an uneconomic-size plant for existing volume. Another discrepancy might be from the profit planning system, which might indicate an unfavourable price variance on an existing product line, which could reflect a deterioration in the competitive position of the company. Still another discrepancy may be due to planning gap, which is identified as a result of long-term planning.

A discrepancy, produced by the information systems of the organisation, initiates a search for a solution that may result in the definition of a capital expenditure project. Such a project requires both technical and economic analysis which is carried out in the initiating phase of the resource allocation process.

The focus in the initiating phase is on a discrepancy between the actual versus desired value of a key variable such as size of market, profit margin, price, operating cost, quality, and technological competitiveness. The discrepancy is often first noted at a low level of management, and the type of discrepancy depends both on the key success factors that have been communicated through the organisation as well as the information systems present in the organisation. Definition of a project, then, often begins at a fairly low level within the organisation, where technical expertise is most likely to be found. Once a project, defined at low levels of the organisation, usually is proposed for approved by upper-level division managers.

The next sub-process of the resource allocation decision-making process involves selling the project, and it is in this second sub-process where the greatest discrepancy exists between the projects actually selected and those that would be selected if a formal selection procedure alone led to the choice. Normally, approval for major investment decisions lies at top levels of a firm: that is, it is vested in corporate managers of investment centres. Projects, defined at low levels of the organisation, usually are proposed for approval by upper-level division managers

It is at the division manager level, therefore, where projects must find support, or what Bower calls impetus. This is a sub-process where division managers evaluate the division goals and objectives and decide whether to "promote" a project for approval. Often, in the process, the division manager attempts to influence the definition of the project to bring it more closely into line with division and corporate objectives

In deciding whether to support a project, a division manager considers both corporate objectives as well as the responsibility and reward structure of the firm. The division manager must be convinced that the organisational benefits of a project exceed the costs, and the manager arrives at his or her subjective measure of benefits and costs by observing the reward structure of the organisation.

If the rewards of an organisation are so structured that managers are promoted upon their 'batting average' then division managers .will seek projects to promote are most likely to be winners when post audits of projects are conducted rather than those that offer

a moderate probability of an extremely large return but also a moderate probability of becoming labelled a "loser". With this reward structure, a manager would be more likely to choose and promote a project with a short payback period (and presumably low risk) than one with an extremely high, but risky, net present value. With this kind of reward structure in an organisation, one can immediately see the relevance of the payback method, wherein projects are ranked according to the speed with which capital outlays are expected to be recovered even though the payback method is inferior to the net present value method as a resource allocation tool.

On the other hand, if managers who take the firm into new and exotic, but marginally profitable, businesses are rewarded, the promoter will find those projects attractive and might be led to define and support such "imaginative" projects. If corporate management wishes to produce such results, it has to bring its reward structure into congruence with profit-maximising criteria, such as the NPV method. It can do that by using the approval phase of resource allocation to screen out proposals without this justification and by promoting managers to corporate ranks who have good “track records” in promoting highly profitable projects. To summarize this section, we may say that a division manager will choose to sponsor investment projects those based upon corporate goals and reward structure, advance his or her career.

4.6.3 Arbitrage Pricing Theory

Arbitrage pricing theory is one of the tools used by the investors and portfolio managers. The capital asset pricing theory explains the returns of the securities on the basis of their respective betas. According to the previous models, the investor chooses the investment on the basis of expected return and variance. The alternative model developed in asset pricing by Stephen Ross is known as Arbitrage Pricing Theory. The APT theory explains the nature of equilibrium in the asset pricing in a less complicated manner with fewer assumptions compared to CAPM.

Arbitrage: Arbitrage is a process of earning profit by taking advantage of differential pricing for the same asset. The process generates riskless profit. In the security market, it is of selling security at a high price and the simultaneous purchase of the same security at a relatively lower price. Since the profit earned through arbitrage is riskless, the investors

have the incentive to undertake this whenever an opportunity arises. In general, some investors indulge more in this type of activities than others. However, the buying and selling activities of the arbitrager reduces and eliminates the profit margin, bringing the market price to the equilibrium level.

The assumptions:

1. The investors have homogenous expectations.
2. The investors are risk averse and utility maximisers.
3. Perfect competition prevails in the market and there is no transaction cost.

The APT theory does not assume (1) single period investment horizon, (2) no taxes, (3) investors can borrow and lend at risk free rate of interest, and (4) the selection of the portfolio is based on the mean and variance analysis. These assumptions are present in the CAPM theory.

The APT Model: According to Stephen Ross, returns of the securities are influenced by a number of macro economic factors. They are: growth rate of industrial production, rate of inflation, spread between long term and short term interest rates and spread between low-grade and high grade bonds. The arbitrage theory is represented by the equation:

$R_i = \lambda_o + \lambda_1 bi_1 + \lambda_2 bi_2 \ \ldots\ldots + \lambda_j bi_i$

R_i = average expected return

λ_1 = sensitivity expected return to bi_1

b_{i1} = the beta co-efficient relevant to the particular factor

Whatever be the number of factors built into the model, two securities with the same factor betas, should provide the same expected return. If not, arbitrage (i.e., the process of buying the cheaper and selling the expensive) will take place and security prices adjust themselves. The investors will try to realise arbitrage profits, if there is disequilibrium and adjust their portfolios and the security prices are driven to equilibrium.

Carrying further their piece of research work, Richard Roll and Stephen Ross believed that there are **five** specific factors that capture systematic risk of a portfolio of securities. They are:

i) Changes in the expected inflation
ii) Unanticipated changes in inflation

iii) unanticipated changes in industrial production
iv) unanticipated changes in the yield differential between low and high gnad securities (known to be default risk premium).
v) unanticipated changes in the yield differential between long term and short term bonds (known to be the term structure of interest rates).

5. SUMMARY

Risk-return trade off is the kingpin of entire financial decision making. Investors compare return to the amount of risk they undertake. A systematic comparison of this risk and return could be possible only when we are able to measure the risk in precise terms. This leads us to know the nature of risk and its types. Basically, risk is divided into two types as: systematic risk and unsystematic risk. Systematic risk refers to that portion of total variability in returns caused by factors external to the investor; such as changes in the economy, political system and social conditions. Systematic risk is again caused by three factors, viz., market risk, interest rate risk and purchasing power risk. While unsystematic risk is caused by controllable actors like the policies of the company. The contribution of CAPM led to the estimation of relationships between risk and return. The model also has given a good measure of systematic risk. Improvements in the CAPM model have been suggested leading to the Arbitrage Pricing Theory.

6. SELF-ASSESSMENT QUESTIONS / EXERCISES

1. Define the concept of Return.
2. Define the concept of Risk.
3. What factors to cause variations in Return and risk.
4. What are the various statistical techniques available to measure risk
5. Explain with suitable illustrations the contribution of CAPM.
6. Explain in brief the ideas of Arbitrage Pricing Theory.

7. FURTHER READINGS

1. Van Horne, James C. *Financial Management and Policy*, New Delhi, Pearson Education Inc., 2002.
2. Rao, Ramesh, K.S. *Financial Management*, New York, Macmillan Publishing Co., 1987.
3. Fischer, Donald, E. & Jordon, Ronald J. *Security Analysis and Portfolio Management*, New Delhi, Prentice Hall of India, 1990.
4. Kevin, S., *Portfolio Management*, New Delhi, Prentice Hall of India, 2001.

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