CHAPTER II
RISK-RETURN RELATIONSHIP: A THEORETICAL REVIEW

The development of the theoretical relationship between risk and expected return is built on two economic theories: portfolio theory and capital market theory. Portfolio theory deals with the selection of portfolios that maximize expected returns consistent with individually acceptable levels of risk. Capital market theory deals with the effects of investor decisions on security prices. It shows the relationship that should exist between security returns and risk, if investors constructed portfolios as indicated by the portfolio theory. The risk and return relationship indicates how much an asset’s expected return should be given its relevant risks, as it also specifies how an asset should be priced. Hence the risk and return relationship is also referred to as an asset pricing model.

Financial performance remains the key fundamental driver of investment decisions for a majority of investors. Investment is ‘commitment of funds made in the expectation of some positive rate of return’. It is therefore imperative for investors to invest in companies that register impressive performance. However, investors should exercise caution while selecting companies for investment. Earnings declared by companies should not be taken at their face value. Rather a rigorous ‘forensic’ analysis should be applied to them in order to ascertain their veracity before taking an investment decision.

Some of the key aspects to look for while arriving at a decision include checking whether the company practices good corporate governance or not and whether it has a clean and investor friendly track record or not. It is very important to select a company with strong fundamentals including strong growth

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visibility as these are factors that would drive future gains on the investment. Consistently high profitability is one of the hallmarks of a good business; so is the ability of the company to consistently give above average returns to the investor. This is measured from the dividend paying history of the company as well as its stock price performance. It is useless to invest in a company whose shares are not liquid. There is no point in holding stocks if they cannot be sold when required. Other important factors include health and financial soundness of the promoters, the policies of the company towards its employees, etc. Very often, one finds stocks fulfilling all the above criteria but whose prices stagnate for a long period of time. It is therefore important to invest in stocks that enjoy the attention of the ‘smart money’ and are in ‘momentum’.

Equity markets are presently displaying strong momentum and occasional hiccups on the way up, as nothing goes up in a straight line. But an investor following the basics, as enumerated above, should not be unduly worried. Remember, selecting the right stock, entering into it at the right time and exiting at an opportune moment after making reasonable gains is the hallmark of a successful investor. Common objective of financial investors is to achieve an optimal risk-return combination. It can be achieved either by maximizing return with an accepted level of risk or by minimizing risk with an acceptable rate of return. Diversification impacts risk components in the portfolio. It is achieved through a spread of investment and allows a middle road through the highs and lows of market performance. Diversification allows an opportunity for investors to grow with minimum volatility. Securities behave differently from one another within the same market based on its own performance, industry sector condition, national and international factors and so on.

In the last three decades, a large number of countries had initiated financial reform process to open up their economies and integrated into the global

4 K.K.Bajaj(2009), “Selecting the right stock is the key to successful investing”, Investors India, Vol. 7 (8), Aug. p 3.
economy. India is one of the late entrants, with the reform process officially started in 1991 only. The Indian stock market is possibly one of the oldest in Asia, but remained at a small scale and largely outside the global integration process until late 1980s. The Mumbai Stock Exchange has been traditionally governed by brokers often leading to conflict of interest situations between the interest of common investors and those of brokers and owners of stock exchanges. With the establishment of NSE, a new institutional structure was introduced in India that could ensure smooth functioning of market through a combination of new technology and efficient market design.

2. 1 Indian Capital Market - An Overview

The Indian financial system has undergone structural transformation over the past decade. The financial sector has acquired strength, efficiency and stability by the combined effect of competition, regulatory measures and policy environment. While competition, consolidation and convergence have been recognized as the key drivers of the banking sector in the coming years, consolidation of the domestic banking system in both public and private sector is being combined with gradual enhancement of the presence of foreign banks in a calibrated manner. The efficiency of various segments of the financial system also increased.

Concurrently, the issues of corporate governance and appropriate disclosures for enhancing market discipline have received increased attention for ensuring transparency and greater accountability. Financial sector supervision is increasingly becoming risk based with the emphasis on quality of risk management and adequacy of risk containment. The capital market in India has become efficient and modern over the years. It has also become much safer. Corporate governance needs to be strengthened.

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6 Ibid, p.3
Being the fastest growing economy in the world, India beckons wealthy investment in its market. Indian stock market is rapidly going higher and higher and increasingly becoming popular among the foreign investors. There are so many reasons why investors all around the world are showing interest in the Indian stock market. There are conspicuous factors that have made the Indian stock market a preferred investment choice over other international stock markets.

India is the second largest country in the world in terms of population and hence the country is the second largest consumer market in the world as well. So, there is no doubt, businesses will flourish in the country with a steady rise. For the last few years India has seen steady economic growth. The parameters that are used to measure the overall economic standard of the country are on the rise. The higher GDP, rate of annual growth, foreign currency reserve, Human development index – all these factors are at a satisfactory level, registering a consistent growth.

The Securities and Exchange Board of India is the authority that oversees the activities of the stock exchanges in India. The strict monitoring of the SEBI and carefully laid down acts and rules have made the Indian stock markets more efficient, trustworthy and transparent. The online trading facility has surely made the Indian stock markets more accessible to foreign investors and Non-Resident Indians. This facility helps to invest in the Indian stock market from anywhere in the world and at any time of the day.

When other countries in the west have been worst hit with economic and industrial recession, India has held on to its positions as one of the least affected countries. It is the bindings of the regulations and control of the government on some sectors that have made it possible to withstand the global recession, described as the worst economic depression. With acquisitions, mergers and takeovers, Indian industry is seeing it all. As an investor, one can always take the

8 www.articlebase.com/day-trading-article/15
advantage of these events and make benefits from the Indian stock market. The entire process of estimating return and risk for individual securities is the ‘security analysis’.

2. 2 Security Analysis and Portfolio Management

An investor considering investment in securities is faced with the problem of choosing from among a large number of securities. The choice depends upon the risk-return characteristics of individual securities. The investor will choose the most desirable securities and likes to allocate his funds over this group of securities. Another problem that an investor faces is the decision to hold which securities and how much to invest in them. The risk-return characteristics of portfolios made up of individual securities, differ clearly from those of its each constituent security. The investor chooses the optimal portfolio taking into consideration the risk-return characteristics of all possible portfolios.

As the economic and financial environment keeps changing, the risk-return characteristics of individual securities as well as portfolios also change. It requires periodic review and revision of investment portfolios of investors.\(^9\)

2.2.1 Security Analysis

The process of examining and evaluating individual securities is to estimate the results of investing in them. It involves the projection of future earnings or dividends, forecasts of share price and intrinsic value of a security. It establishes the framework for risk-return analysis. Security analysis as a discipline must achieve\(^{10}\)

- A true picture of a company as a going concern.
- A carefully prepared estimate of normal earning power.

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• A projection of future profitability and growth.
• A translation of all conclusions into a valuation of the company.
• A tool for efficient portfolio management.

Numerous and various types of investment securities are available to an investor. From this vast group of securities, the investor has to choose those that are worth including in his portfolio. Security analysis is the initial phase of the portfolio management process. Traditionally there have been essentially two schools of thought concerning the security valuation and the behavior of share prices. They are: (i) ‘Fundamentalist’ or Intrinsic Value Analysis School, and (ii) Technical Analysis School or ‘Chartists’

(i) **Fundamental Analysis**

Investment success is pretty much a matter of careful selection and timing of stock purchases coupled with impeccable matching to individual risk tolerance. In order to carry out selection, timing and matching actions, an investor must conduct deep security analysis. Fundamental analysis is really a logical and systematic approach to estimating the future dividends and share price. It is based on the basic premise that share price is determined by a number of fundamental factors relating to the economy, industry and company.

Fundamental analysis examines all the dimensions of risk exposure and the probabilities of return, and merges them with broader economic and greater industry analysis to formulate the valuation of a stock. It analyses the economic environment, industry and company performance before making an investment decision. Analysis of the economy, strategy, management, product, financial status and other related information help to choose shares that will outperform the market and provide consistent gains to the investors. The presumption behind fundamental analysis is that a thriving economy fosters industrial growth, leading to the development of companies. Thus, to forecast future share prices, fundamental analysis combines ‘economic’, ‘industry’ and ‘company’ analysis to
derive a share’s current fair value and to forecast its future value from this information.

(ii) Technical Analysis

Besides this fundamental information, the market price may also be influenced by other psychological factors such as perception, sentiment and timing of investors. The proxy for the measure of this psychological factor is the past share price of the company itself. A study of past share price behavior to predict the future trend is termed as technical analysis. Technical analysis is based on the economic premise. The forces of demand and supply determine the pattern of market price and the volume of trading in a share. The rationale behind technical analysis is that share price behavior repeats itself over time and an analyst’s attempt to derive methods to predict this repetition.11 The greater the demand for a company’s share, the higher is its market price. Likewise the greater the supply of a company’s share in the market, the lower is its market price. The technical approach to investment is essentially a reflection of the share price move in trends that are determined by the changing attitudes of investors towards a variety of economic, monetary, political and psychological forces. Since technical analysis has a huge quantum of information in terms of intra-day traded prices and opening and closing day prices. The data is represented mostly in terms of charts. Charts plot the price information well and several observations have been made from the information of similar patterns over a period of time.

2.2.2 Portfolio Management

An investor invests the funds in a portfolio expecting to get a good return consistent with the risk that the investor has to bear. The return realized from the portfolio has to be measured and the performance of the portfolio has to be evaluated. It is clear that rational investment activity involves creation of an

11 S. Kevin, op.,cit. p 97.
investment portfolio. Portfolio management comprises all the processes involved in the creation and maintenance of an investment portfolio. It is a complex process which tries to make investment activity more rewarding and less risky.

**Phases of Portfolio Management**

Portfolio management is a process encompassing many activities aimed at optimizing the investment of one’s funds. The five different phases are:

1. Security Analysis
2. Portfolio Analysis
3. Portfolio Selection
4. Portfolio Revision
5. Portfolio Evaluation

**Security Analysis**

It consists of examining the risk-return characteristics of individual securities. There are two alternative approaches to security analysis, namely fundamental analysis and technical analysis. Fundamental analysis concentrates on the fundamental factors affecting the company such as the earnings per share of the company, the dividend pay-out ratio, the competition faced by the company, the market share, quality of management etc. Technical analysis, dealing with the share price movements, is systematic and exhibits certain consistent patterns.

**Portfolio Analysis**

A portfolio is a group of securities held together as investment. Investors invest their funds in a portfolio of securities rather than in a single security because they are risk averse. Portfolio analysis consists of identifying the range of possible portfolios that can be constituted from a given set of securities and calculating their return and risk for further analysis.
Portfolio Selection

The inputs from the portfolio analysis can be used to identify the set of efficient portfolios. From this set of efficient portfolios the optimal portfolio has to be selected for investment. Fundamental analysis and technical analysis help the investor in evaluating securities individually and select them for suitable investment decisions.\(^\text{12}\)

Portfolio Revision

The investor has to constantly monitor the portfolio to ensure that it continues to be optimal. As and when the changes take place, the composition of security should be shuffled and changes made accordingly to attract more return.

Portfolio Evaluation

It is a process which is concerned with assessing the performance of the portfolio over a selected period of time in terms of risk and return. This involves quantitative measurement of actual return realized and the risk borne by the portfolio over the period of investment.

2.3 Capital Asset Pricing Model (CAPM)

The relationship between risk and return established by the security market line is Capital Asset Pricing Model. It is basically a simple linear relationship. The higher the value of beta, higher would be the risk of the security and therefore, larger would be the return expected by the investors. That is, all securities are expected to yield returns commensurate with their riskiness as measured by \(\beta\). This relationship exists for individual securities as well as for portfolios whether efficient or not. It postulates that systematic risk is the only important ingredient in determining expected return\(^\text{13}\).

\(^{12}\) S Kevin, op.,cit. p 2.
\(^{13}\) S Kevin, op.,cit. p 201.
The systematic risk is measured by \( \beta \). The \( \beta \) coefficient tells us how much systematic risk a particular asset has, relative to a portfolio that contains all assets in the economy. The portfolio that contains all assets in the economy is called the market portfolio. This portfolio places a central role in CAPM. The market portfolio is unobservable, and therefore, it has to be proxied by some index like the stock market. Technically, \( \beta \) is the covariance of a stock’s return with the return on a market index scaled by variance of that index. It is also measured as slope in the regression of a stock’s return on market. CAPM is a model that describes the relationship between risk and expected return and that is used in the pricing of risky securities. The expected return on security can be found out by:

\[
\bar{r}_i = r_f + \beta_i (r_m - r_f)
\]

where, expected return on a security = risk free return + (beta \times risk premium of market)

The general idea behind CAPM is that investors need to be compensated in two ways: time value of money and risk. The time value of money is represented by the risk-free \((r_f)\) rate in the formula and compensates the investors for placing money in any investment over a period of time. The other half of the formula represents risk and calculates the amount of compensation the investor needs for taking an additional risk. This is calculated by taking a risk measure \((\beta)\) that compares the returns of the asset to the market over a period of time and to the market premium \((R_m-R_f)\)^14.

One of the important outcome of the CAPM assumptions is that all investors hold a portfolio which is a combination between riskless portfolio and market portfolio. This is because all investors will have identical efficient frontiers due to the assumption of homogenous expectations. They can however, have different utility functions, which all decide what combination of riskless portfolio and market portfolio the investor will choose. This implies that all

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14 www.investopedia.com/terms/c/capm.asp.
investors hold the same combination of risky securities, the market portfolio. This is also known as the separation theorem\textsuperscript{15}. The return on market portfolio is the weighted average return of all risky assets in the market and it contains art, objects, commodities, real estates, gold etc. Total risk of portfolio consists of unsystematic risk and systematic risk. It can be measured by the variance of the return. If CAPM holds, investors should hold diversified portfolios and systematic risk is the only important variable to the investors. Thus beta is a measure of the non-diversifiable risk in a portfolio.

2.4 Risk and Return

The relationship between risk and return is an essential factor in all human decision making. Each investment that a firm undertakes, for example, must offer a return that is at least as high as the return on a similarly risky investment on financial markets. Otherwise shareholders would choose to invest in the financial markets rather than in the firm portfolio theory. Risk is explained theoretically as the fluctuation in returns from a security. A security that yields consistent returns over a period of time is termed as “riskless security” or “risk free security”. Whereas, a security whose returns fluctuate significantly is considered a high-risk security. Equity shares whose returns are likely to fluctuate widely are considered risky investments. Risk is the potential for variability in returns.\textsuperscript{16}

Evolution of the Measurement of Risk in Finance

1. Early 1900's:

During the early part of the century, the quality of the balance sheet was the primary determinant of risk. Firms having relatively greater debt levels and

\textsuperscript{15} www.iimb.ernet.in/-vaidya/capital_asset.doc

relatively low levels of current assets in relation to current liabilities were thought to be riskier firms.

2. Graham and Dodd and Fundamental Security Analysis:

During the 1920's and 1930's, Benjamin Graham and David Dodd pioneered the techniques that have come to be known as fundamental security analysis. They argued that by carefully analyzing financial statements, investors could find securities whose intrinsic value was substantially greater than the current market price. They suggest that investors can simultaneously minimize risk and maximize return if only they purchase securities providing a suitable ‘margin of safety’.

3. Harry Markowitz and the Statistical Measurement of Risk:

During the 1950's, Markowitz argued that risk measures must explicitly account for the variability of asset returns, which he measured using the standard deviation of a security's return. His work was important because it shifted the focus of risk measurement from the risk of each security measured in isolation to the contribution of each security to the risk of a well-diversified portfolio. It is the risk that a security adds to a well-diversified portfolio that should be used to determine the risk-adjusted rate of return used in capital budgeting.

4. Multifactor Models of Risk and Return:

A great deal of current research in Finance concerns the development of procedures for precisely calibrating the impact of multiple risk factors (e.g., interest rates and the prices of key industrial materials such as oil) on the required returns of publicly traded stocks.\(^\text{17}\)

On a macro level there are two main types of risks - Systematic risk and Unsystematic risk.

\(^\text{17}\) [www.exinfm.com/training/630118.rtf]
2.4.1 Systematic Risk

Systematic risk refers to that portion of total variability (risk) in return caused by factors affecting the prices of all securities. Economic, political, and sociological changes are the main sources of systematic risk. Though it affects all the securities in the market, the extent to which it affects a security varies from one to another. The systematic risks of various securities differ due to their relationship with market. Systematic risk can not be diversified but measured in terms of beta (β), a statistical measure. The ‘β’ factor describes the movement in a security’s or a portfolio’s return in relation to that of the market returns. Beta of one (β=1), indicates that volatility of return on the security is same as the market or index; beta more than one (β>1) indicates that the security has more unavoidable risk or is more volatile than market as a whole, and beta less than one (β<1) indicates that the security has less systematic risk or is less volatile than market.

2.4.2 Unsystematic Risk

Unsystematic risk refers to that portion of total risk that is unique or peculiar to a firm or an industry, above and beyond that affecting securities markets in general. Factors like consumer preferences, labour strikes, management capability etc. cause unsystematic risk (variability of returns) for a company’s stock. Unlike systematic risk, the unsystematic risk can be reduced/avoided through diversification. Total risk of a fully diversified portfolio equals the market risk of the portfolio as its specific risk becomes zero.

Important micro types of risks that are taken into account for the valuation of a stock or bond include:

Every investment opportunity carries some risks or the other. In some investments, a certain type of risk may be predominant, and others not so significant. Seven major risks are present in varying degrees in different types of investments.18

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1. Default risk

This is the most frightening of all investment risks. The risk of non-payment refers to both the principal and the interest. For all unsecured loans, e.g. loans based on promissory notes, company deposits, etc, this risk is very high.

2. Business risk

The market value of the investment in equity shares depends upon the performance of the company where one invests in. If a company's business suffers and the company does not perform well, the market value of the share can go down sharply. This invariably happens in the case of shares of companies which hit the IPO market with issues at high premium when the economy is in a good condition and the stock markets bullish. Then if these companies could not deliver upon their promises, their share prices fall drastically.

3. Liquidity risk

Liquidity risk refers to the possibility of the investor not being able to realize its value when required. This may happen either because the security cannot be sold in the market or prematurely terminated, or because the resultant loss in value may be unrealistically high.

4. Purchasing power risk or inflation risk

Inflation means being laden with a lot of money in one’s pocket. When prices shoot up, the purchasing power of money goes down. Some economists consider inflation to be a disguised tax. However, the recent trend of rising inflation across the globe is posing serious challenge to the governments and central banks. In India's case, inflation, in terms of the wholesale prices, which remained benign during the last few years, began firming up from June 2006 onwards and topped double digits in the third week of June 2008. The skyrocketing prices of crude oil in the international markets as well as that of food items are now the two major concerns facing the global economy, including India.
5. Interest rate risk

In this deregulated era, interest rate fluctuation is a common phenomenon with its consequent impact on investment values and yields. Interest rate risk affects the value of bonds more directly than stocks.

6. Political risk

The government has extraordinary powers to affect the economy; it may introduce legislation affecting some industries or companies in which invested, or it may introduce legislation granting debt-relief to certain sections of society, fixing ceilings of property, etc. Change in government policies is one reason for political risk. International political developments also have an impact on the domestic scene, what with markets becoming globalized. This was amply demonstrated by the aftermath of 9/11 events in the USA and in the countdown to the Iraq war early in 2003. Through increased world trade, India is likely to become much more prone to political events in its trading partner-countries.

7. Market risk

Market risk is the risk of movement in security prices due to factors that affect the market as a whole. Natural disasters can be one such factor. The most important of these factors is the phase (bearish or bullish) the markets are going through. Stock markets and bond markets are affected by rising and falling prices due to alternating bullish and bearish periods. Thus Bearish stock markets usually precede economic recessions. Bullish stock markets are witnessed during economic recovery and boom periods.

The forces that contribute to the variation in expected return can be treated to be the risk forces. An asset’s total risk equals to its total variability of return. The total variability of return is measured using either the variance or the standard deviation of the one period rates of return.
\[
\sigma^2 = n \sum (r_i - \bar{r})^2 P_i
\]

\[
\sigma^2 = \text{Variance of returns}
\]
\[
r_i = \text{‘i’ th rate of return from the probability distribution.}
\]
\[
P_i = \text{the probability that ‘i’ th rate of return occurs.}
\]
\[
\bar{r} = \text{expected returns.}
\]

In the context of portfolio of assets, the riskiness is measured by the standard deviation of its expected returns rather than by considering the weighted average of the risk of individual assets\(^{19}\).

\[
\sigma_p = \sqrt{\sum_{j=1}^{n} \left( r_{pj} - \bar{r}_p \right)^2 P_j}
\]

where
\[
p = \text{standard deviation of the portfolio expected returns.}
\]
\[
r_{pj} = \text{return on the portfolio under ‘j’th state of the economy.}
\]
\[
\bar{r}_p = \text{expected return of return on the portfolio}
\]
\[
P_j = \text{probability of occurrence of ‘j’th state of the economy}
\]

Combining stocks into portfolios would reduce the risk compared to the risk of individual assets. That part of the risk of an average stock which can be reduced through combining stocks into portfolios is called diversifiable or company specific risk.\(^{20}\) Thus, the risk in the context of an individual security is measured by the standard deviation of its returns, whereas the risk of a portfolio of securities, related to the systematic risk, which is not diversifiable, can be measured.


Not all the seven types of risks may be present at one time in any single investment. Secondly, many-a-times the various kinds of risks are interlinked. Thus, investment in a company that faces high business risk automatically has a higher liquidity risk than a similar investment in other companies with a lesser degree of business risk. Success skill in managing one’s investments lies in achieving the right balance between risks and returns. Where risk is high, expected returns can also be high.

2.5 Return

The rate of return is the single most important outcome from an investment. Equity investors expect this return from their investment to be in the form of cash dividend and stock dividend. If “\( P_{t-1} \)” refers to the market price per security at the beginning of period ‘t’, the one period rate of return from an equity share can be defined as,

\[
R_{it} = \frac{P_{it} - P_{it-1} + D_t}{P_{it-1}}
\]

where,

\( P_{it} \) = Closing price of a share  \\
\( P_{it-1} \) = Opening price of a share  \\
\( D_t \) = Cash dividends per share paid during the period ‘t’.

\( P_{it} - P_{it-1} \) = Capital gain or loss.

But, in an uncertain world, one cannot tell in advance exactly what rates of return an investment will yield. However, one can formulate a probability distribution of the possible rates of return. Then the “expected return” would be the sum of products of various one-period rates of return times their probabilities. That is,

\[
E (r) = \sum_{t=1}^{T} P_t r_t
\]

where, \( r_t \) = the rate of return in a probability distribution at time ‘t’, \( P_t \) = Probability that ‘t’\textsuperscript{th} rate of return occurs.
The expected return on a portfolio, or combination of assets is simply a weighted average of expected returns of individual securities in the portfolio\textsuperscript{21}.

\[ \hat{r}_p = \sum_{i=1}^{n} X_i r_i \]

where,

\[ \hat{r}_p \] = Expected rate of return on a portfolio.

\[ X_i \] = Proportion of the portfolio invested in the ‘i’ th asset

\[ r_i \] = Expected rate of return on ‘i’ th assets

\[ n \] = Number of assets in the portfolio

\section*{2.6 The Risk-Return Trade-Off}

The CAPM of Sharpe, (1964); Lintner, (1965), argues for a linear relationship between the expected returns and systematic risk (beta). But later on CAPM has been seriously challenged because empirical evidence indicates that betas are not significantly related to returns, Fama and French (1996).\textsuperscript{22}

Although a good amount of literature has been developed in the context of risk-return relationship judging its linearity through widely acclaimed CAPM, the unrealistic assumption behind the theoretical base has not permitted to fully validate them empirically. However, the models have found an important role in the context of portfolio and investment analysis due to their logical appeal. One of the basic postulates of modern portfolio theory is that there exists a tradeoff between risk and return. Portfolio theory deals with the selection of optimal portfolios by rational risk averse investor; that is, by an investor who attempts to maximize his expected portfolio returns to be consistent with the individually acceptable levels of portfolio risk.


Capital market theories deal with the implication for security prices of the decision made by these investors; what relationship should exist between security return and the risk if investors behave in this optimal fashion, Modigliani and Pogue, (1974)\textsuperscript{23}. Efficient market theory further suggests that excess profit from specific investment strategies are competed away and in the long run, the return from a portfolio is largely explained by, and proportionate to its risk content, Sinha and Others(1979)\textsuperscript{24}.

It is imperative to note that the main plank on which the relationship between risk-return, the two facets of investment, is based on the implicit assumption in finance theory that investors are rational and risk aversive. The implication of risk averse assumption would be that the investors seek to minimize risk for a given level of return.

On the other hand, the investor’s perception of the variability of ex-ante returns would contribute to their decision to buy-and-hold or to sell a security. It is possible to express these investors’ expectations of ex-ante returns in the form of probability distribution based on past experience which would proxy for ex-post information.

2.7 Beta

According to CAPM, beta is the only relevant measure of a stock's risk. It measures a stock's relative volatility, that is, it shows how much the price of a particular stock jumps up and down compared with how much the stock market as a whole does so. If a share price moves exactly in line with the market, then the stock's beta is 1. A stock with a beta of 1.5 would rise by 15% if the market rose by 10%, and fall by 15% if the market fell by 10%.


\textsuperscript{24} S. L. N. Simha, Hemalatha D. and Balakrishna S(1979), Investment Management, IFMR Publication, Madras.
Beta is found by statistical analysis of individual daily share price returns, in comparison with the market's daily returns over precisely the same period. Financial economists Black, Jensen and Scholes(1972), confirmed a linear relationship between the financial returns of stock portfolios and their betas. They studied the price movements of the stocks on the New York Stock Exchange between 1931 and 1965.

**Beta value of individual security is,**

\[
\beta_i = \frac{Cov(r_i, r_m)}{Var(r_m)}
\]

‘\(r_i\)’ and ‘\(r_m\)’ is the individual security return and market return of a particular period.

**Portfolio beta coefficients is,**

The beta coefficient associated with a portfolio is based on the betas of the individual investment in the portfolio; the portfolio beta is determined by computing the weighted average of the betas associated with the individual investments contained in the portfolio:

\[
\beta_p = \sum_{j=1}^{N} W_j \beta_j
\]

where \(\beta\) represent the beta coefficients and \(W_j\) is the percent of the total amount invested in the portfolio that is invested in investment ‘\(j\)’.

The formula for the Beta of an asset within a portfolio is, Where ‘\(r_a\)’ measures the rate of return of the asset, ‘\(r_p\)’ measures the rate of the portfolio of which the asset is a part and \(Cov(r_a, r_p)\) is the Covariance between the rate of return. In the CAPM formulation, the portfolio is the market portfolio that contains all risky assets, and so the ‘\(r_p\)’ terms in the formula are replaced by ‘\(r_m\)’ the rate of return of the market.

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Beta is also referred to as financial elasticity or correlated volatility, and can be referred to as a measure of the sensitivity of the assets return to market return, its non-diversifiable risk, its systematic risk or market risk. On individual asset level and portfolio level, measuring beta can give clues to volatility and liquidity in the market place. The beta of an asset, $\beta_i$, is a measure of the variability of that asset relative to the variability of the market as a whole. Beta is an index of the systematic risk of an asset.

The beta movement should be distinguished from the actual return of the stocks. For example, a sector may be performing well and may have good prospects, but the fact that its movement does not correlate well with the broader market index may decrease its beta. However it should not be taken as a reflection on the overall attractiveness or its absence for the sector, or stock as the case may be. Beta is a measure of risk and not to be confused with the attractiveness of the market.

The beta coefficient was born out of linear regression analysis. It is linked to a regression analysis of the return of a portfolio (such as a stock index) (X-axis) in a specified period versus the return of an individual asset (Y-axis) in a specific year. The regression line is then called the Security Characteristic Line (SCL).

### 2.7.1 Estimation of Beta

To estimate beta, one needs a list of returns for the asset and returns for the index. These can be daily, weekly, monthly or of any period. A plot should be made with the index returns on the X-axis and the assets returns on the Y-axis, in order to check that there is no serious violation of the linear regression model assumptions. The slope of the fitted line from the linear least square calculation is the estimated beta. The Y intercept is the alpha. Significance of beta in financial analysis considers that...

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• Beta has no upper or lower bound, and beta as large as 3 or 4 will occur with highly volatile stocks.
• Beta can be zero. Some zero beta securities are risk free, such as treasury bonds and cash. However, simply because a beta is zero does not mean that it is risk free. A beta can be zero simply because the correlation between that item and the market is zero.
• A negative beta simply means that the stock is inversely correlated with the market. Many gold related stocks are beta negative.
• A negative beta might occur even when both the benchmark index and the stock under consideration have positive returns. It is possible that lower positive returns of the index coincide with the higher positive returns of the stocks or vice versa. The slope of the regression line, that is, the beta, in such a case will be negative.
• Using beta as a measure of relative risk has its own limitations. Most analyses consider only the magnitude of beta. Beta is a statistical variable and should be considered with its statistical significance (R Square value of the regression line). Higher R-square value implies higher correlation and a stronger relationship between returns of the asset and benchmark index.
• Since beta is a result of regression of one stock against the market where it is quoted, betas from different countries are not comparable.

Beta can be estimated subjectively by analysts or historical betas can be used as an estimate for future betas. Historical betas are estimates using regression analysis. The slope coefficient, or beta is one of the basic concepts of Capital Market Theory. So measurement is important. An essential prerequisite for using beta to assess future portfolio risk and return is a reasonable degree of predictability over future time periods.27

In the present competitive globalized business scenario, risk is attached with every dimension. The concept of risk management in case of investment decision assumes paramount importance in the modern day financial management. Though risk cannot be completely eliminated, it can be reduced by taking precautionary measures\(^{28}\). Risk is the measurable uncertainty, Knight(1921)\(^{29}\) in predicting the future events that are affected by external and internal factors.

Beta, which is associated with systematic risk, helps the investor to measure the degree of risk associated with it. In portfolio management, beta has been regarded as the single most important aspect of risk in common stock. Rosenberg(1985)\(^{30}\) supported the importance of beta since it determines the systematic risk; and in a diversified portfolio, systematic risk is the bulk investment risk.

When the return on the portfolio is more than the return on the market, beta measure is greater than one and those portfolios are referred to as aggressive. That means, in a blooming market situation, aggressive portfolio will perform much better than the market performance. While in a bearish market condition the fall of aggressive portfolios will also be much prominent. On the other hand, when the return on portfolio is less than one, those portfolios are termed as defensive. In case of defensive portfolios, when the market is rising, the benefits associated with it will be less than the market portfolio. However, when the market moves down, the decline in the defensive stock would also be less than the market portfolio. In those situations where, the return of the portfolio exactly matches the return of the market, beta is equal to one that rarely occurs in real life.

situations. Aggressive stocks are supposed to be riskier but provide a potential for higher returns; defensive stocks pose less risk but also lower return\textsuperscript{31}.

2.8 Efficient Market Hypothesis (EMH)

The efficient market hypothesis states that the capital market is efficient in processing information. An efficient capital market is one in which security prices equal their intrinsic values at all times, and where most securities are correctly priced. An efficient market is characterized, theoretically, by the presence of a large number of rational, profit seeking, risk averse investors with homogeneous expectations, costless information and zero transaction costs. These conditions are unobtainable in reality. However, Fama(1970) observes that for informationally efficient markets to exist, it is enough if there are a sufficient number of investors, transaction costs are reasonable and no evidence of consistent extra-normal rates of return obtained by a single (or a set of ) investor(s)\textsuperscript{32}.

An increase in the market’s operational efficiency would lead to a reduction in transaction costs and also lead to a more continuous market for the securities. The reduction in transaction cost and continuous markets would help in achieving informational efficiency.

Broadly speaking, a market is said to be informationally efficient, if, at every point in time, the current price of securities fully reflects all available and relevant information. This implies that the security prices are accurate with unbiased estimates of its underlying true value. As security prices are unbiased estimates of the underlying value, investors can rely on prices to allocate their funds efficiently among various users.


\textsuperscript{32} S.Kevin op.,cit. p 123
A market is said to be allocationally efficient if it can maintain equivalent rates of return on comparable investments. It follows that the differing rates of return among securities are due to the inherent differences in their riskiness. It also follows that the more efficient firms will have easier access to cheaper funds. The allocational efficiency of the market is, therefore, dependent on how efficiently the prices, and hence the returns, adjust to new information.

The arrival of new information in the market would set off a fierce competition among the investors to predict the future value of the individual stocks. Competition among these investors would lead to their discounting rapidly, all new information which would then be used for price setting. The EMH relates to how quickly and accurately the market reacts to new information. If the market is informationally efficient then security prices adjust rapidly and accurately to information. According to the hypothesis, security price reflects fully all the information that is available in the market. Since, all the information is already incorporated in prices, a trader is not able to make any excess returns.

An efficient securities market is one where the prices of securities traded on that market at all times “properly reflect” all information that is publicly known about those securities. In general terms, the ideal is a market in which prices provide accurate signals for reasonable allocation, that is, a market in which firms can make productive investment decisions, and investors can choose among the securities that represent ownership of firms activities under the assumption that securities prices at any time ‘fully reflect’ all available information, Fama(1970)\textsuperscript{33}.

2.8.1 Forms of Efficient Market

The phrase ‘efficient market’ is used to describe the market price that fully reflects all available information has been coined by Fama. Furthermore, he

classifies the market efficiency into three levels on the basis of the information: Weak, Semi-Strong and Strong forms.

1. **Weak Form EMH**

   The weak form of the efficient market hypothesis says that the current price of the stock already fully reflects all the information that is contained in the historical sequence of the prices. That is, the price of a stock already stands adjusted to all the historical information available about it. The new price movements are completely random. There is no benefit in studying the historical sequence of prices to gain abnormal returns from trading in securities.

   No excess returns can be earned by using investment strategies based on historical share prices or other financial data. Weak-form efficiency implies that technical analysis will not be able to produce excess returns. To test weak-form efficiency, it is sufficient to use statistical investigations on time series data of prices. In a weak-form efficient market, current share prices are the best, unbiased, estimate of the value of the security. The only factor that affects these prices is the introduction of previously unknown news. News is generally assumed to occur randomly. So share price changes must also be random.

   In the 1960’s, the efficient market theory was known as the random walk theory, where share price movements followed random walk. Robert(1977) and Rosenberg(1982) found that stock price movements follow a random walk, “the random walk hypothesis simply states that at a given point in time, the size and direction of the next price change is random with respect to the knowledge available at that point in time”.

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2. Semi-Strong Form EMH

This form of the theory maintains that the current stock prices instantaneously and fully reflect all the public information about the security such as corporate reports, corporate announcements, information related to corporate dividend policies, forthcoming stock splits and so on. Thus the efforts by analysts and investors to acquire and analyze public information will not yield consistently superior return. As soon as the information is public, it will be absorbed and reflected in the stock prices. The testing of semi-strong form of EMH includes the testing of market reaction to accounting information, stock splits and block trading.

Share prices adjust instantaneously and in an unbiased fashion to publicly available new information, so that no excess returns can be earned by trading on that information. Semi-strong-form efficiency implies that fundamental analysis will not be able to produce excess returns. To test semi-strong-form efficiency, the adjustments to previously unknown news must be of a reasonable size and must be instantaneous. To test this, consistent upward or downward adjustments after the initial change must be looked for. If there are any such adjustments, it would suggest that investors interpreted the information in a biased fashion and hence in an inefficient way.

3. Strong Form EMH

The current stock prices instantaneously and fully reflect all known information about the securities including the privately available inside information. Share prices reflect all information and no one can earn excess returns. To test strong form efficiency, a market needs to exist where investors cannot consistently earn excess returns over a long period of time. When the topic of insider trading is introduced, where an investor trades on information that is not yet publicly available, the idea of a strong-form efficient market seems impossible.
According to the EMH, this means that stocks always trade at their fair value on stock exchanges, and thus it is impossible for investors to either purchase undervalued stocks or sell stocks for inflated prices. Thus, the crux of the EMH is that it should be impossible to outperform the overall market through expert stock selection or market timing.

2.9 Conclusion

Capital market has become an integral part of the economies of all countries. Investment in securities market requires the study of the relationship between risk and return. Capital Asset Pricing Model is an equilibrium theory of risk and return. It asserts that there is a linear relationship between an asset’s risk (beta) and its required rate of return. Thus the required rate of return is a premium added to the risk free rate depending upon the beta of an asset.

Both external and internal factors affect the prediction of future movements of share prices. They are market related and firm specific factors. The variability in returns due to market related factors is considered in equity valuation. But firm specific factors can be avoided through diversification of investments.

A rational investor expects a reasonable return on his investment. Investors differ in their willingness to accept risk for a greater return. But if investors are willing to invest in the stock market, then they are willing to assume some risk. What the capital asset pricing model provides is a consistency to the risk premiums. If an investor is willing to accept higher risks to get higher returns, then it makes sense to demand a higher return for a higher risk; otherwise, why take the higher risk. By comparing the risk premium of a stock with that of the general market, an investor can determine whether the return of a stock is worth its risk. Hence, this study focuses on the importance of risk-return relationship of equity shares in India.