Chapter 2
Review of Related Literature
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REVIEW OF RELATED LITERATURE

The Investment Performance of Mutual Fund portfolios has been subjected to extensive research in the literature of Finance. The evaluation of the performance of the Portfolio Managers has a long history starting from the 1960s followed by various theories. Earlier research by Friend, Brown, Herman and Vickers (1962), Sharpe (1966) and Jensen (1968) indicated that Mutual Fund managers have the difficulty of beating the market but frequently performed at a level inferior to the market. During the early period, Capital Asset Pricing Model was used for performance evaluation. However, Jaganathan and Wang in the year 1996 have argued that using the stock market index, as the proxy for the market portfolio is a poor descriptor of cross-sectional stock returns.

Recent empirical studies have revealed that the performance of the CAPM improves whenever broader definitions of the market portfolio are used or a conditional version of the model is used (Jaganathan and Wang, 1996). As a result, the recent studies on the performance of the fund use multifactor models to evaluate the fund performance (Carhart 1997). These extended models also often perform, as well as the factor model (Fama and French,
1993) in explaining cross-sectional stock returns. However, these models are not much in use for evaluation of the fund performance.

According to Robert A Strong "A percept of Finance Theory is the concept of utility maximization". Investors try to maximize the expected utility associated with their decisions. **The essence of performance evaluation of an investment portfolio is associated with a measure of risk with the returns on the portfolio.**

**Impact of Capital Markets on Mutual Fund Schemes**

Mutual Funds invest their funds in the Capital Market instruments such as shares, debentures, bonds, government securities and money market instruments. The Net Asset Value (NAV) of such investments reflects the market values of underlying assets at a particular given time. Due to the fluctuations in the Capital Market, it is bound that the Net Asset Value of Mutual Fund schemes also goes up and down depending on the Market conditions. The degrees of risk are the highest in equities and therefore the fluctuations in the Stock exchanges has a higher impact on the net asset value of the schemes (www.amfiindia.com).

The success story of any economy is on the basis of the sound financial condition of any country. The economic reforms in 1991 had a major impact
on the financial system of India and thus lead to the development of the Indian economy. The Indian Financial system is considered the most stable and sound as compared to any other Asian Country. The Mutual Funds have emerged as the important segment in the Financial segment of India. They now play a very vital role in channelising the savings of millions of individuals into the investments in the equity and the debt market.

Prior to the year 1991 Indian economy was suffering from low savings, low GDP, high inflation, high unemployment, high rates of interest, low forex etc. The result of the LPG process due to the economic reforms imposed by IMF is clearly visible now.

Diversification is the biggest advantage associated with Mutual Funds. Diversification is the idea of investing money across different types of investment avenues. When one investment is not doing well, other might be yielding good profit. Diversification reduces risk significantly. Now a days, a higher portion of investors savings is now invested in market-linked avenues like Mutual Funds as compared to earlier times. However, if we compare proportion of people investing in Mutual Funds in India with that in U.S then we find that in U.S more than 50% people invest in Mutual Funds whereas in India the proportion is less than 10%. This gives the indication that there is much more untapped potential for growth in this industry in India, which must be explored, in the coming time. In conclusion, it can be said that despite few
problems, the recent changes in the Mutual Funds industry in India has really favoured its amazing growth and in conclusion it can be said that in times to come Mutual Funds will continue to be a significant resource mobilizer in the Indian financial market (Rao Hanumantha P, Mishra Vijay Kr, March 2007).

It can be noted that both the capital markets and the Mutual Funds have a direct impact on each other.

**Market Timing and Mutual Fund Investment Performance**

It has always been said that the market timing has to be perfect to maximize the performance of the schemes. What does the Market Timing signify to an Investors, its like picking up the right stock at the right time. Picking the right stock when the price of the stock is at the rock bottom and selling the stock when the price of the stock is at the peak is considered to be the perfect timing for the purchase and sale of an investment. Fund Managers often find it very difficult to be precise for the entry and exit timing, which often affects the performance of the schemes. It is very difficult to know when the stock will be at the rock bottom price and when it may reach the peak, for which the Fund Managers have to continuously monitor their stocks to match the market timing. However, results suggest that neither skillful market timing nor clever security selection abilities are evident in observed Mutual Fund data and the general conclusions have been unable collectively to outperform a passive
investment strategy still seems valid (Chang Eric C and Lewellen Wilbur G, 1984). Thus even though the Fund Manager may have perfect market timing or select the best security yet he may not be able to outperform the passive investment strategy.

The Investment Performance of the Mutual Fund portfolio has been subjected to extensive examination in the literature of Finance. The Market timing is the act of anticipating the market trends (high/low) and striving to outperform the market by that act. The strategy of market timing is better left to the market experts. Timing the markets is very difficult. Many Investors are aware that profits can be made when we buy low and sell high but most of them end doing the opposite. The main reason being the fear and panic in an eventual fall in the market. The concept of market timing in context of fund or portfolio is different in a Mutual Fund Industry. A parametric statistical procedure that allows a joint test for the presence of either superior market timing or security selection skills in managed portfolio was applied to examine empirically the investment performance of a sample of Mutual Funds during the decade of the 1970s by Chang Eric C and Lewellen Wilbur G, 1984. The general conclusion of the prior literature that the Mutual Funds have been unable to collectively outperform a passive investment strategy was held valid.
The Portfolio Activity and Performance

The portfolio activity can be categorized into two folds viz the need to invest new money received from the sale of funds and the management decisions to change the existing portfolio structures. The portfolio turnover rate is calculated by the average of portfolio sales and purchases during a given period of time divided by the average value of the portfolio at the beginning and the end of that period.

A high degree of portfolio activity will increase the cost of the fund like the brokerage cost etc. This cost may create a load on the returns of the funds. Fund purchases securities for investment purposes and not for short-term trading profits. Funds may sell securities without regard to the length of time that the security is held in the portfolio, if such sale is consistent with the Fund’s investment objective. Mutual Funds are more advantageous than the Individual investors in investment portfolio activity. By portfolio activity they can carry on various activities like reducing risk, diversify their investment, revolving their investments, wide investment opportunity.

The analysis of the interrelationship between fund portfolio activity and fund performance and between fund portfolio activity and market impact has led to various conclusions. The variations in the fund portfolio turnover rates have not been associated with variations in fund performance. High levels of
portfolio activity have worked neither to the advantage nor to the disadvantage of the shareholder. Similarly, the change of the portfolio structures by fund managers has on an average, resulted in no better and also no worse performance than those that would have been achieved by a constant portfolio (Brown and Vickers). The second conclusion is that the portfolio activity has influence on market prices. The short run influence has been demonstrated quantitatively in the individual securities.

Performance and Selection of Security Portfolios

The major problem is evaluating the performance of portfolios of risky investments. The ability of the Fund Manager to increase returns on the portfolio through successful prediction of future security prices and the ability of the Fund Manager to minimize the insurable risk of the stakeholders are the two dimensions of the selection of the security portfolio. The major difficulty to evaluate the performance of a portfolio is the lack of a thorough measurement of risk. It has been observed on an average the Mutual Funds are not able to predict security price well enough to outperform a buy and hold policy but also that there is very little evidence that any individual fund was able to do significantly better than that which we expected from mere random chance (Jensen).
Stock selection is the core in an investment decision-making and the diversification of the portfolio. The performance of a fund depends on proper stock selection. It refers to the ability of the Fund Manager to identify the under valued and the over valued stock securities. It is also the ability of the Fund Manager to forecast the company specific events. The stock selection and the market timing are the prime activity of the Fund Manager for the performance of the fund. Therefore, professional fund managers are highly paid for their investment decision-making process.

A study of the Investment Manager’s stock selection skills is very much important as it enables the Fund Manager how they have fared in achieving the desired results. It also helps the Investors to assess how well the fund manager has performed as compared to some benchmark indices. It also provides to identify the weakness in the investment decision-making process. These weaknesses can be viewed and become the feedback mechanism for improving the investment managers forecasting skills.

Majority of the Fund Managers use the Technical Analysis along with the Financial Analysis while trading in the stock market. They tend to use Technical Analysis more frequently in the Bull Phase in the market. The Fund Managers believe that the technical analysis generates superior profits. The stock recommendations provided by the technical traders are related to big companies with high trading volume and medium Price to Book ratios.
(Chandra Ramesh, 2005). Technical findings shall be extremely relevant to technical traders who are continuously on the look out for investment strategies that beat the market. This can also be useful for the software developers who wish to emphasize on the technical toolbox. However, conclusion can be obtained by performing such evaluation on a complete market cycle.

**Impact of International crisis on Stock Market Returns**

Studies have shown that International crises do have impact on the Stock Market Performance. International crisis is the conflict between nations. Where a nation has an export or import with a nation, which has an International crisis, then the stock market returns, will have an impact due to the International Crisis.

International crisis have a significant impact on the economic development. Oil is major source of energy that is being extensively used around the world. Oil price hikes have a significant impact on the economic development. The share prices of the companies that are sensitive to the oil price changes are more likely to hinder the economic growth. Jones and Kaul comment “Given the importance of oil to the world economy, it is surprising that little research has been conducted on the effects of oil shocks on the stock market”. Like the Oil price hikes had a detrimental impact on output and the stock returns in the
United States, Canada, Japan and the United Kingdom. Faff and Brailsford (1999) have reported that the oil price was very sensitive in the some Australian industries.

However, the South Asian Markets namely India, Pakistan and Sri Lanka were away from the Oil Price hikes. It was found that four industries in India viz Electricity, Integrated Oil, Resources and Utilities are sensitive to the oil price factor at 5% level. It was concluded that the oil price changes do not appear to have any significant influence on the stock market returns in India, Pakistan and the Sri Lankan markets (Nandha Mohan and Faff Robert, 2005).

**Size of the Mutual Fund Scheme and the Performance of the Scheme**

Does the fund size matter for the Mutual Fund performance? It has been found that actively managed Mutual Funds have to attain a minimum fund size before they achieve returns sufficient to cover their costs for acquiring and trading on information. It is comparatively easy for the Fund Manager to increase the returns of the schemes, if the size of the scheme is reasonable. The question is what is the reasonable size of the scheme, which would be very difficult to answer. It was also found that there are diminishing marginal returns to information activities and that the marginal returns becomes negative when a Mutual Fund exceeds its optimal size (Indro, Jian, Michael,
Lee, 1999). This implies that the Mutual Fund size should not be small nor too big, which in turn affects the performance of the Mutual Fund.

A similar type of study was conducted by Chen Joseph, Hong Harrison, Huang Ming, Kubik Jeffrey D, in December, 2004, in their Research paper ‘Does Fund Size Erode Mutual Fund Performance? The Role of Liquidity and Organisation’. They had investigated the effect of scale on performance in the active money management industry. Finally using data on whether funds are solo managed or team managed and the composition of fund investments. They explored the idea that scale erodes funds performance because of the interaction of liquidity and organization diseconomies.

They were the first to find strong evidence that the fund size erodes the performance. They then considered various explanations for why this might be the case. They found that this relationship is not driven by heterogeneity in fund styles, fund size being correlated with other observable fund characteristics or any type of survivorship bias. Instead, they find that the effect on fund size on fund returns is most pronounced for funds that play small cap stocks. This suggests that liquidity play's an important role why size erodes performances. They also find that the size of the fund’s family does not significantly erode fund performance. Finally using the data on whether funds are solo-managed or co-managed and the composition of fund
investments, they find that organizational diseconomies affect the relationship between fund size and performance along the lines predicted by Stein (2002).

Age of the Fund and Future Performance of the Mutual Fund Schemes

It has always been put to debate that older the fund it is more likely to give superior returns. Most of the time we see the Investor asking us how old is the fund, is it a New Fund Offer etc. The question is whether the fund can give better performance in case it is an old performing scheme. It can be noted that the future performance is in part predictable from the past performance.

This year’s top performing funds need not necessarily be the best performer in the future year. Therefore Security and Exchange Commission (SEC), US requires the funds to tell investors that a funds past performance does not necessarily predict future results. Even in the Indian Mutual Funds, it is mandatory to state that the “Mutual Funds are subject to Market Risk, Read the Offer Document carefully before Investing”. Apart from the same, the Offer Document specifies the General Risk and the Specific Risk associated with the scheme. In the General Risk, it mentions that the "Past Performance may or may not be sustained in future". It also mentions that "The Past Performance of the Sponsors, AMC, Mutual Fund and their affiliates /
associates is not necessarily indicative of the future performance of the schemes and their future prospects or returns”.

Vanguard’s Bogle offers eight rules in Picking Mutual Funds, which is very interesting and they are:

Rule 1. Select low-cost funds. Bogle advice to the investors is to consider the role expense ratios play in shaping Mutual Fund returns. Rule 2. Carefully consider the added costs of advice. Bogle says investors who need personal assistance should factor the impact that these costs will have on long-term investment returns. Rule 3. Do not overrate past fund performance. “There is simply no way under the sun to forecast a fund’s future absolute returns based on its past record,” Bogle said. Rule 4. Use past performance to determine consistency and risk. “While you should disregard a single aggregate number showing a fund’s past long-term return,” he said, “you can indeed learn a great deal by studying the nature of its past returns.” Rule 5. Beware of “stars.” Bogle warned investors about both the perils of investing with "star" managers and relying on "star" rating systems in the fund selection process. Rule 6. Consider a fund's asset size. "Size can, and likely will, kill any possibility of investment excellence," said Bogle, who advised investors to avoid fund companies that have no history of closing funds to new investors and those that seem willing to let their funds grow to "seemingly infinite size." Rule 7. Don't own too many funds. Bogle recommended a simple five-fund
portfolio, allocated as follows: 50% large cap, 10% mid cap, 20% small cap, 10% specialty, and 10% international. Rule 8. Buy your fund portfolio - and hold it. "Once you decide on your long-term objectives and define your tolerance for risk, it is time to carefully select a fund or small number of actively managed funds that meet your own goals,"

As mentioned by Bogle in Rule 3, Bogle argues that past performance plays an important role in helping you to select your fund for investment. Above all the investor should look for consistency. An investor looks into the fund performance and it's ranking to invest in the Mutual Fund scheme. However there is no simply way to predict the funds future's absolute returns based on the past performance. Bogle further continues in his Rule 4 stating that use the past performance to determine consistency and risk. He also states that the Investor can learn a great deal by studying the nature of its past returns.

Morningstar makes the comparison much easier. It shows a simple chart on where the fund stood in the each quartile in the preceeding 12 years. This chart gives a fair reflection of consistency of the fund policies and the relative success of its Fund Managers. For the fund to be a top performer should have at least six to nine years in the top two quartiles and not more then one to two years in the bottom quartile. Funds, which have four to five years in the bottom quartile, can be normally rejected.
Also the previous study shows that open-ended funds with better performance tend to perform better in the future and therefore they tend to attract more new investment. As Gruger (1996) argues that the first pattern causes most or all of the second, but why is the new investment relationship convex? First the relationship between past and future performance of all but the worst funds also appears to be convex. More important is that convexity follows directly from strategic environment of investment advisors. Recent Studies (Hendricks et al, 1994, Brown and Goetzman, 1995) have found evidence supporting the idea that past performance is related to future performance. Thus a Fund Manager has to ensure that the scheme performs better then the peer schemes to ensure that the fund performs better in the future and also attracts new investments.

**Fund Managers Expertise and the Performance of Mutual Fund Schemes**

Most of the Investors are keen to know whether upon choosing a fund style, are more likely to be rewarded with superior, risk-adjusted returns if they seek out managers with longevity at a fund. Also they are keen to know if the Managers are more likely to generate superior returns over their less experienced counterparts. The common contention is that if a Fund Manager is more experienced he can perform much better and generate higher returns as compare to the less experienced Fund Managers. Most of the Fund houses therefore tend to engage the services of the experienced Fund
Managers so that they can generate higher returns. However, this may not be positive in all the cases, as it has been analyzed that less experience Managers generate higher excess returns than Fund whose Manager have put in at least ten-year tenure.

It has always been emphasized that ‘Experience Counts’. The Morning Star Inc, a provider of Mutual Fund data in the US, suggests that the Manager tenure at a fund and the reputation are the valuable considerations in fund investing. Researchers have linked the time frame and the fund type as the factors for superior performance. Goetzmann and Ibbotson (1994) demonstrated that Managers who perform better than their peers in the one two year period tend to perform better than their peer in the subsequent two-year period. Similarly, Volkman and Wohar (1996) show persistent superior excess return over a three-year investment period are directly related to persistence in prior returns. Grinblatt and Titman (1993) showed that aggressive growth funds produce persistent abnormal returns during the test period.

Gruber (1996) has provided the evidence that sophisticated investors identify superior management and are able to capture positive risk-adjusted returns because management expertise is not priced.
Wermers (2000) concludes that active managers possess the expertise to add value because, on an average they hold stocks that outperform the Center for Research in Security Prices Index.

An analysis of performance of 1,042 Mutual Funds was done for the period 1986 to 1995 to measure the relation between the managers' tenure and the performance of the scheme. Fund Managers who have at least of a ten-year tenure do not generate significant higher excess returns as compared to the less experienced managers. The excess returns of the best managers are not greater than those of their less experienced colleagues.

The results of the above study suggest that, while the excess returns of the funds operating during the research period produce positive excess returns, the risk-adjusted excess returns of funds managed by individuals with at least 10 years tenure are not different from those of funds with varying management. Neither group demonstrates a record of consistency. Consequently, we find no compelling reason to believe that manager tenure is a proxy for expertise that produces superior or consistent performance.

**Scheme Expenses and the Performance of Mutual Fund Schemes**

The expense ratio has a marginal impact on the performance of the Mutual Fund schemes. The operating costs and expense ratios are much higher in
developing countries. Where securities markets are well established, Mutual Funds under perform the market, especially when fees are taken into account. Therefore the standard advice for investors is to invest in low expense index funds (Malkiel 1995, Bogle 1999).

Bogle in his Rule 1 has mentioned, Select low-cost funds. Bogle's advise to the investors is to consider the role of expenses ratio's while considering the Mutual Fund returns. In the Rule 2, he also mentions consider the added costs of advice. Bogle says investors who need personal assistance should factor the impact that these costs will have on long-term investment returns.

There are various type of expenses charged to the Mutual Funds in India. The expenses are mainly charged on the initial issue expenses, recurring expenses and due to the load structure. SEBI has specified the limits for all the above types of expenses to be charged by the Fund. Incase of a NFO, the initial expenses are too high and also the scheme is subjected to the recurring expenses, due to this the scheme has a major impact of the expenses in the initial year. However, if it is an open-ended scheme, the scheme is subjected to regular recurring expenses and the entry or exit load. However, this may not have a major impact on the scheme in the long run.

In India, the investment management and advisory fees have been defined in the Regulation 52 of the SEBI (MFs) Regulation, 1996. SEBI has defined the
maximum percentage of expenses that can be charged to a scheme depending on the type of the scheme. Any expenses over and above the SEBI limits have to be borne by the Asset Management Company. Considering the same does the expense ratio have any major impact on the performance of Mutual Fund scheme?

The Non Financial Performance Measures of Mutual Fund Schemes

The number of firms using non-financial performance measures for incentive purposes is increasing (Banker et al. 2000). There are various reasons why firms are using the non-financial performance measure however the primary reason is that some of them are the leading indicators of financial performance (Kaplan and Norton 1992; 2001). Non-financial performance measures therefore provide managers with incentives to improve long-term financial performance. The Non-financial performance measure reduces the short-term orientation of the manager and the manager focus on the long-term impact of their actions.

The use of financial and non-financial performance measures for incentive purposes do not affect the time orientation of managers in a direct manner. Rather they have an indirect effect working through the difficulty of performance targets. That is, the use of financial (non-financial) performance measures increases the difficulty of financial (non-financial) performance
targets, which subsequently increases (decreases) managerial short-term orientation (Moers, 2000). Firms use different types of non-financial performance measures and not all provide managers with long-term incentives.

The performance evaluation of Mutual Fund schemes has always been an issue to the Investors. However, the literature available focuses mainly on the financial measurements. Non Financial Measures plays a vital role in the performance of the schemes. Seniority and the Fund Managers experience play a major role in the financial performance measures. Also professional qualification and the incentive paid to the Fund Managers affects the performance of the schemes. Incentive based on the Fund performance of the scheme gives a boost to the performance of the scheme, like higher the incentive higher the performance of the scheme. It has been exhibited that, although fund Managers characteristics like Professional certificates, seniority, relevant market experience etc do have a significant effect on funds current performance, it also has significant effect on the future performance (Liang Chiung-Ju and Yao Ming-Li, 2005). Also when the incentive of compensation is inadequate, fund managers are inclined to adopt a more conservative or passive investment attitude, not only lowering the variance of the return but also lowering funds profit (Liang Chiung-JU and Yao Ming-Li, 2005).
The Ratios, the Theories and practice of evaluating the performance of an Investment Portfolio

Portfolio Evaluation prior to 1960

Prior to the 1960’s, investors evaluated the performance of their portfolio purely on the basis of the rate of returns on their Investments. Most of the Investors were aware about the concept of risk however they were not aware how to measure their portfolio risk or how to quantify the risk involved in their portfolio and the returns received by the Investor from their Portfolio.

This lead to development of the Portfolio theory in the early 1960s which showed the Investor how to measure or quantity risks in terms of the variability of returns. Since no single measure combined risk and returns, the two factors had to be considered separately as researchers had done in their early study. At present, there is more emphasis on the risk-adjusted returns.

Peer Group Comparison by Kritzman

Mark P Kritzman describes this as the most common manner of evaluating portfolio managers. In Peer Group comparisons, the portfolio performance is compared with peers of the same length of time and same style. There is no adjustment for risk in the Peer Group comparison. The first thing is to collect
the returns by a representative universe of investors over a fixed period of time and display them in a box plot format. To aid the comparison the universe is divided into percentiles, which indicate the relative ranking of a given Investor. Although these comparisons can go quite detailed, it is common to plot the box plot graphic to get the minimum and the maximum returns, as well as the returns falling in the different percentile.

This the is most common method used for evaluating fund managers display returns from the representative sample of investors over a specific time period in a box plot graphic (Kritzman 1990). As mentioned above the returns are divided into percentile indicating each fund's ranking. This method does not explicitly adjust for the fund's risk level, which is problematic. Risk is implicitly considered by selecting funds with same level of risk in the sample, which is not possible with funds having different investment styles and length (Reilly and Brown).

There are certain drawbacks in the peer group comparison method of evaluating the Investors performance. In the box plot format mentioned above, we do not make any explicit adjustment of risk level of the portfolio in the universe. A second point is that it is almost impossible to form a truly comparable peer group that is large enough to make the percentile ranking valid and meaningful. Lastly, at focusing on the relative returns, such a comparison loses sight on whether the Investor has accomplished his
individual objectives and whether his individual investment constraints are satisfied.

**Traditional Portfolio Theory**

The traditional portfolio theory estimates the return on an individual security is the amount of dividend, price earning ratio, the holding period and the market value of the shares. This theory recognizes specified type of risks like interest rate risk, financial risk etc. This theory is based on the fact that risk can be measured on each individual security through the process of standard deviation.

One of the major breakthrough in the investment field during the past few decades was the creation of the optimum investment portfolio. An optimum investment portfolio does not form by diversification in a lot of unique individual securities, which have the desirable risk-return characteristics. Today, the Fund Manager has to build optimum portfolio that has to meet his investment objectives. The basic assumption of the portfolio theory is that Investors wants to maximize the returns from the investments made for the given level of risk.
Markowitz Portfolio Theory

Modern Portfolio Theory or the Portfolio theory was developed by Harry Markowitz in 1952 with his paper "Portfolio Selection" published in the Journal of Finance. In the early 1960s, the fund managers and investors used to talk about risk, but had no specific way to measure risk. The basic portfolio model was developed by Harry Markowitz, who derived the expected rate of return for the portfolio and an expected risk measure. According to Markowitz the Portfolio Manager has to calculate the expected returns on the securities and analyze these estimates to determine an efficient set of portfolios.

Markowitz showed that the variance in the rate of returns of the portfolio was a meaningful measure of portfolio risk under a reasonable set of assumptions and he derived the formula for computing the variance of a portfolio. Due to the possibility of reducing risk through diversification, the risk of the portfolio, measured as its variance, will depend not only on individual variances of the returns of the different securities but also on the pairwise covariance's of all the securities. Although there are numerous measures of risk, Markowitz used the variance or standard deviation of returns for the efficient set of portfolio.
Markowitz in his Portfolio Theory had studied the risk, which was the systematic risk. Following the development of the portfolio theory by Markowitz, two major theories have put forth that derive a model for the valuation of risky assets viz The Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT).

**Capital Asset Pricing Model (CAPM)**

Sharpe, William F, Lintner John, Mossin J were the pioneers of the development of the Capital Asset Pricing Model. The Capital Asset Pricing Model is based on certain assumptions:

- Investors are Markowitz efficient investors who want to maximize the returns.
- Investors can borrow or lend any amount of money at the risk-free rate of return (RFR).
- Investors have homogeneous expectations.
- Investors have the same one-period time horizon.
- Investments are infinitely divisible.
- There are no taxes or transaction costs involved in buying or selling of assets.
- Capital Markets are in equilibrium.
\[ E(R) = RFR + \beta(R_m - RFR) \]

Where

- \( E(R) \) = is the expected return rate on a security.
- \( RFR \) = is the rate of a "risk-free" investment, i.e. cash.
- \( R_m \) = is the return for the market portfolio.
- \( \beta \) = Standardised measure of systematic risk.

The CAPM was the most useful and frequently used financial economic theory ever developed.

**Arbitrage Pricing Theory**

Ross Stephen had developed the Arbitrage Pricing Theory in the year 1976. The major difference between the CAPM and APT is that the APT specifies several risk factors thereby becomes a more expansive definition of systematic investment risk that was implied by the CAPM.

The Arbitrage Theory states that the price of the security reflects a few risk factors of the security. If the price of the security happens to diverge from
what the theory says it should be, arbitrage by Investors should bring it back into line.

The Theory states that the expected return of the security can be modeled as a linear function of various macroeconomic factors, where any change in each factor which is represented by a factor specific beta coefficient. The derived rate of return then will be used to price the asset correctly. The asset price should equal the expected rate of return at the end of the period. If the price diverges, arbitrage should bring it back into line.

**Composite Portfolio Performance Measurement Models**

Several eminent authors have worked to determine the risk-adjusted returns of investment portfolios. Since 1960s, the composite performance indices theories have evolved to evaluate the performance of the portfolio. The most important and widely used measures of performance are:

- The Treynor Measure
- The Sharpe Measure
- The Jenson Model
- The Fama Model
Treynor Composite Performance Measure

Treynor was the first to develop the first composite performance measure of portfolio performance that included risk in the year 1965. He constituted two components of risk viz risk due to market fluctuation and risk due to unique fluctuations in the portfolio securities. To identify the risk due to market fluctuation, Treynor introduced the characteristic line, which gives the relationship between the rate of return of a portfolio over a specified period of time and the rate of return for an appropriate market portfolio during that time. Treynor argues that by using the characteristic line, one can determine the relationship between the security and the market. The Treynor's Index of measure provides a measure of return compared to beta, a measure of systematic risk. Treynor's measure can be appropriate risk measure for a single security as well as the portfolio.

This performance measure applies to all Investors, regardless their risk preference. The deviation form the characteristic line indicates that unique return for the portfolio relative to the market. These differences arise due to the returns on individual stocks in the portfolio.

Treynor was interested in a performance measure that would apply to all the Investors regardless of their risk preference. Based on the developments in Capital Market theory, he introduced a risk free asset (like Treasury Bills) that
could be combined with different portfolio and form a straight portfolio possibility line. The slope of the portfolio possibility line defined as \( T \) equals to

\[
T = \frac{R_i - RFR}{\beta_i}
\]

Where

\( R_i \) = the average rate of return from the portfolio \( i \) during a specified period of time.

\( RFR \) = the average rate of return on risk free investment during the same period of time.

\( \beta_i \) = Beta, the slope of the funds characteristic line during the same period of time.

The larger the value of \( T \) indicates larger slope and a better portfolio for all Investors. To compare the above portfolio possible line with the market possible line the same above equation can be used to the value of \( T_m \) which will indicate the market possible line. Therefore the higher \( T \) value of portfolio as compare to the market portfolio, indicates that the given portfolio has performed better than the market and vice versa.
Sharpe Composite Performance Measure

William F Sharpe conceived the composite measure to evaluate the performance of Mutual Fund in 1966. This measure followed his earlier work of the Capital Asset Pricing Model (CAPM) dealing with the Capital Market Line. Treynor used the beta as a measure of risk; the Sharpe measure uses the Standard Deviation of returns to measure risk. This composite measure of portfolio performance seeks to measure the total risk of the portfolio by using the Standard Deviation of the returns rather than considering the systematic risk summarized by beta.

In this theory, the S measure compares the portfolio to the Capital Market Line, whereas the T measure compares the portfolio with the Security Market Line. The S measure is defined as under

\[
S_i = \frac{R_i - R_{FR}}{\sigma_i}
\]

Where

- \( R_i \) = the average rate of return from the portfolio i during a specified period of time.
- \( R_{FR} \) = the average rate of return on risk free investment during the same period of time.
\( \sigma_i \) = Standard Deviation of the rate of returns for portfolio i, during the same period of time.

The Standard Deviation can be calculated by either using the total portfolio returns or the portfolio returns in excess of the risk free rate. The Sharpe measure evaluates the portfolio manager on the basis on both rate of return and diversification as it considers total portfolio risk in the denominator.

**Jensen Portfolio Performance Measure**

The Jensen Portfolio Performance Measure is based on the CAPM. Jensen profounded the Portfolio Performance Measure in the year 1968. Jensen's Alpha measures excess returns, if any, above (or below) the fund risk-adjusted return as expected in the CAPM. The expected return on any security or portfolio can be calculated by the following expression:

\[
E(R_j) = R_{FR} + \beta_j [E(R_m) - R_{FR}]
\]

Consequently, we are concerned with the time series returns for the security or portfolio. We get the following expression in terms of realized return:

\[
R_{jt} = R_{FR_t} + \beta_j [R_{mt} - R_{FR_t}] + e_{jt}
\]
Subtracting the risk free return from both sides we have

\[ R_{jt} - R_{FRt} = \beta_j [R_{mt} - R_{FRt}] + \epsilon_{jt} \]

Alternatively, superior portfolio managers who forecast market or select undervalued securities earn higher risk premium, than implied by the above model. To detect this superior performance, you must allow for an intercept that measures any positive or negative difference from the model. Consistent positive intercepts indicate superior performance and negative intercept indicates inferior performance. Thus the above equation will become:

\[ R_{jt} - R_{FRt} = \alpha + \beta_j [R_{mt} - R_{FRt}] + \epsilon_{jt} \]

Where

- \( R_{jt} \) = the expected return on security or portfolio \( j \).
- \( R_{FR} \) = the one period risk free interest rate.
- \( \alpha \) = value indicates whether the portfolio manager is superior or inferior in market timing and/or stock selection
- \( \beta_j = \) the systematic risk (B) for security or portfolio \( j \)
- \( R_{rm} = \) the expected return on the market portfolio of risky assets.
The $\alpha$ indicated in the above expression indicates the intercept. The $\beta$ indicates whether the portfolio manager is superior or inferior with reference to the market timing or the stock pick.

The Jenson model has several advantages over the Sharpe and Treynor model. Firstly it is very easy to interpret. As seen above if the value for Alpha is .05, it interpret that the portfolio manager has given 5% more than the expected returns given the portfolio risk level. Secondly, it can give the statistical significance of the Manager's skill level, or the difference in skill level between different portfolio managers. Thirdly this model is very flexible and can allow for alternatively model of risk and expected return than the Capital Asset Pricing Model.

**Fama Measures**

Fama suggested a much finer breakdown of performance in the year 1972. Fama integrates the work of Sharpe, Treynor and Jensen. Fama states that the overall performance of a portfolio, which is its return in excess of the risk free rate (RFR), can be decomposed into measures of risk taking and security selection skill.

\[
\text{Overall performance} = \text{Excess Return} = \text{Portfolio Risk} + \text{Selectivity}
\]
This can be expressed as:

\[ R_x = R FR + \frac{R_m - R FR}{\sigma(R_m)} \cdot B_x \]

Based on the above the Fama Models can be used further for the evaluation of selectivity, diversification and risk. From the above performance measures, two models namely, Treynor measure and Jenson model use systematic risk on the assumption that the unsystematic risk is diversifiable.

**Fama French Model**

As compared to the macroeconomic explanations wherein we compare the risk and expected returns, it is possible to specify risk in microeconomic terms using certain characteristics of the securities. Typically this was the multifactor model work of Fama and French who used the following functional model:

\[ R - R FR = \alpha + \beta(R_m - R FR) + b_s \times SMB + b_v \times HML \]

Where

- \( R \) = The portfolio’s return rate.
- \( R FR \) = The Risk Free Return Rate.
- \( R_m \) = The stock market return known as market return.
SMB = (Small minus Big) is the return to a portfolio of small capitalization stocks less the return to a portfolio of large capitalization stocks.

HML = (High minus Low) is the return to a portfolio of stocks with high ratios of book-to-market values less the return to a portfolio of low book-to-market value stocks.

There are three-factor betas, and two additional factors to do some of the work. The SMB and HML which represents the 'Small (cap) Minus Big' and 'High (book/price) Minus Low', these two factors measure the historic excess returns of small caps and value stocks over the market as a whole. The way SMB and HML are defined, the corresponding coefficients $b_s$ and $b_v$ take values on a scale of roughly 0 to 1: $b_s = 1$ would be a small cap portfolio, $b_s = 0$ would be large cap, $b_v = 1$ would be a portfolio with a high book/price ratio, etc.

Information Ratio

Information Ratio is used to measure the excess return of the Investment Manager divided by the amount of the risk the Investment Manager takes relative to the benchmark. It is used in the analysis of performance of Mutual Funds. The higher the Information Ratio it is better for the Fund Manager. It also indicates that the higher the information ratio, the higher the excess return of the fund, given the risk involved.
The ratio is calculated as under:

\[ \text{Information Ratio} = \frac{\text{AnnRtn}(r_1, ..., r_n) - \text{AnnRtn}(s_1, ..., s_n)}{\text{AnnStdDev}(e_1, ..., e_n)} \]

- \( r_1, ..., r_n \) = manager return series
- \( s_1, ..., s_n \) = benchmark return series
- \( e_1, ..., e_n = r_1 - s_1, ..., r_n - s_n \)

The Information Ratio tries to measure not only the excess returns to the benchmark but also tries to measure how consistent is the performance. The investors would prefer to know, whether the Investment Manager gives a consistent return or a lot of return during particular month. The Information Ratio helps the Investor to measure this degree of consistency.

Information ratio is relative. It measures the return and the risk of the Fund in relation to the benchmark. It takes the difference between the Fund's return and the benchmark return, which is the excess return of the benchmark. It divides this by the standard deviation of the excess return, which is also known as the funds tracking error. The higher the Information Ratio indicates that the Investment Manager was able to take advantage of the available opportunities to give excess return.