CHAPTER III

METHODOLOGY

The methodology of the present research work entitled “Performance Of The Indian Mutual Fund Industry: A Study With Special Reference To Growth Schemes” is as follows:

SOURCES OF DATA

The study is a blend of both primary and secondary data. Secondary data were collected from the records of AMFI, UTI Institute of Capital Markets, and web sites of respective mutual funds.

The primary data required for the study was collected using a detailed interview schedule / questionnaire from fund managers, brokers and investors respectively. Before the preparation of schedule / questionnaire discussions were held with the AMFI Chairman, Director of Society for Capital Market Research and Development, Dean of UTI Institute of Capital Markets, Officials of SEBI, CRISIL Fund Services Ltd, Credence Analytics (India) Pvt Ltd and Value Research India Private Limited for first hand information. A structured questionnaire was prepared and tested through a pilot study among investors. The questionnaire was revised and administered to elicit the perception of investors and brokers on their preference for mutual funds. Investors,
brokers and fund managers were contacted in person for the sake of
collection of primary data required for the study.

**SAMPLING FRAME**

The Indian Mutual Fund Industry came under liberalized
environment in the year 1993 with the introduction of SEBI (Mutual
Funds) Regulations. The industry was brought under the uniform
regulatory control with the implementation of SEBI (Mutual Funds)
Regulations 1996. Hence, this study attempts to review the performance
of the industry from 1997-98, after the introduction of uniform rules and
regulations to March 2006.

To study the risk and return relationship, the sampling frame
includes all the 25 schemes launched in the year 1993 in the IMFI. On
the basis of types of scheme, 2 were open-end and 23 were close-end. Of
the 25 schemes, from the objective point of view, 10 were growth
schemes, 8 were tax saving schemes, 4 were income-cum-growth
schemes and 3 were income schemes. Since 92 percent (23 schemes)
were close-end and 40 percent (10 schemes) were growth schemes, a
detailed in-depth study of all the existing seven growth schemes was
undertaken for the present study. All the seven short listed schemes were
initially close-end and latter converted into open-end on various dates.
Thus, the sampling frame for the purpose of the study constitutes the follows schemes:

- SBI Magnum Multiplier Plus 1993
- LIC MF Equity Fund [LIC Dhanvikas (1)]
- Cangrowth Plus [GIC Growth Plus II]
- UTI Opportunities Fund [UTI Grandmaster 93]
- Franklin India Bluechip Fund [Kothari Pioneer Blue Chip Fund]
- Franklin India Prima Fund [Kothari Pioneer Prima Fund]
- HDFC Capital Builder Fund [Zurich India Capital Builder Fund]

Note: Scheme names within square brackets indicate their previous name.

Using schedules, opinion survey of fund managers was restricted to the seven schemes selected for the research work. Out of 46 brokers registered with the Coimbatore Stock Exchange, 26 were inactive. The remaining 20 brokers were contacted using questionnaire to collect the opinion of brokers adopting census method.

To elicit information from the investors, all the investors registered in the Kovai Investors Association were contacted between January 2005 and September 2005. Four hundred and sixty investors were members in Kovai Investors Association as on December 15, 2004. All the investors holding mutual funds were surveyed adopting census method. A detailed questionnaire covering various aspects of the investment decision of
investors were prepared and finalized. After pre-testing, the same research instrument was distributed in various meetings of Kovai Investors Association and collected personally from the investors. The response rate was 75.63 percent. Thus, the primary sampling frame for the present study consists of seven fund managers, 20 brokers and 360 investors.

TOOLS OF ANALYSIS

The tools like return, risk, and risk-free rate of return were used for risk-return analysis of schemes in relation to that of the market as per Sharpe, Treynor and Jensen Models. The major portion of funds mobilized through growth schemes are invested in equity shares. In analyzing the risk-return relationship the CAPM is used widely. The CAPM uses the concept of beta to link risk with return. Beta as a measure of systematic risk shows how the NAV of a growth scheme responds to changes in market performance. Using the beta concept the CAPM helps to define the required return on a security. The equation for calculating the expected return based on CAPM is as follows:

\[ R_i = R_f + \beta (R_m-R_f) \]

- \( R_i \) = Expected return
- \( R_f \) = Risk-free return
- \( \beta \) = Measure of systematic risk
\[ R_m = \text{Market return} \]

The following tools of analysis adopted in this study were the same as used in the previous studies by Carlson Robert S(1970), Fama Eugene(1972), Sarkar A K(1991), Shashikant Uma(1993), Yadav R A(1996), Jayadev M(1996), Wilfred L Dellava(1998), Gupta Amitabh(2000), Sondhi H J(2005), and others over the time period.

NAV values on every Monday of the sample schemes for the period of (April 1998 to March 2006) eight years were used based on the data available.

**Portfolio Return** refers to the yield from the selected growth schemes with growth option. Portfolio returns \((R_p)\) are calculated on the basis of changes in the NAV on a weekly basis. Average of such weekly returns \((AR_p)\) is calculated on a yearly basis and for the entire period of study as follows:

\[
R_p = \frac{\text{NAV}_t - \text{NAV}_{t-1}}{\text{NAV}_{t-1}}
\]

\(R_p\) is the return of the portfolio on a weekly basis

‘t’ is the time period

**Market Return** is calculated on the basis of the changes in the BSE 100 Index on a weekly basis \((R_m)\) and the averages of such weekly returns
(ARₘ) are arrived at for every year and for the total period of study. BSE 100 index was used as a benchmark for the selected growth schemes as it is widely considered as a market proxy or benchmark for the purpose of academics, research and practicing fund managers. BSE 100 index is used as a benchmark as it is a broad based index, consisting of 100 actively traded equity shares representing more than 70 percent of the total market capitalization in Bombay Stock Exchange. The market return is calculated as follows:

\[
R_m = \frac{\text{Market Index}_t - \text{Market Index}_{t-1}}{\text{Market Index}_{t-1}}
\]

**Risk-free return** (Rᵣ) is the return available from zero risk investment avenues like treasury bills and bank deposits. The current RBI bank rate of 6.00 percent is assumed as the risk-free rate of return as it has been constant for many years and is related with the most commonly preferred investment avenue namely bank deposits.

**Risk** is the uncertainty and variability of returns / capital appreciation or loss of both. Total risk is measured with the help of standard deviation of both scheme and market returns. The total risk of an investment consists of two components: Diversifiable and non-diversifiable risk.
Diversifiable (Unsystematic) risk represents that portion of an investment’s risk that can be eliminated by holding enough number of varied types of securities. Unsystematic risk is that portion of total risk calculated as follows:

\[
\text{Unsystematic Risk} = (\sigma_p^2) - (\beta^2 \times \sigma_m^2)
\]

\( \sigma_p \) Standard Deviation of the Scheme

\( \sigma_m \) Standard Deviation of the Market

Non-diversifiable (Systematic) risk is that part of total variability in returns caused by factors due to economic, social and political causes. Systematic risk is not unique to an investment avenue and is unavoidable. Each security possesses its own level of systematic risk, which is measured using beta coefficient.

\[
\text{Systematic Risk} = \beta^2 \times \sigma_p^2
\]

Beta reflects how volatile the return from an investment in response to market swings. It measures the impact of the market forces on return expected from funds. Beta is calculated by relating portfolio return with market return using regression analysis. Beta greater than one, depicts high sensitivity of scheme’s returns against market being aggressive. Beta values less than one indicates defensive nature of the scheme. The regression slope coefficient from the Characteristic Regression Line
(CRL) measures the systematic risk of an asset. The CAPM is applied to compute the beta value from the following formula:

\[ R_i = \alpha + \beta R_m + e \]

**Covariance** reflects the degree to which the market and scheme returns vary. A positive covariance means that the market and scheme returns move in the same direction whereas a negative covariance implies that the return moves in the opposite direction. Covariance is calculated using the formula:

\[ \text{C.V} = \left( \frac{\sigma_p}{\bar{X}_p} \right) \times 100 \]

\( \bar{X}_p \) is the mean return of the scheme

**Coefficient of Correlation** (r) measures the nature and the extent of relationship between stock market index return and the scheme’s return for a particular period. The co-movement of schemes performance with that of market index is studied with the help of a simple linear regression analysis using the following formula:

\[ r = \frac{\sum xy}{\sqrt{\sum x^2} \times \sum y^2} \]

\( x = (X - \bar{X}) \)

\( y = (Y - \bar{Y}) \)
**Autocorrelation Coefficient** measures the association within the chronological sequence of observations of net assets value to verify whether the present NAV value is based on the past NAV and is calculated using the formula:

\[
\hat{r}_k = \frac{\sum_{i=1}^{n-k} (y_i - \bar{Y})(y_{i+k} - \bar{Y})}{\sum_{i=1}^{n} (y_i - \bar{Y})^2}
\]

- \( y_i \) denote an observation in a time sequence ‘t’
- \( y_1 \) denote the first or earliest observation
- \( \hat{r}_k \) is called the lag \( k \) sample autocorrelation coefficient
- \( \bar{Y} \) denotes the mean value of variable \( Y \)

**Coefficient of Determination (R\(^2\))** is the square of the correlation coefficient and indicates the degree of diversification. It gives the percentage variation in the scheme’s return as explained by the variation in the market’s return. A low \( R^2 \) indicates that scheme has further scope for diversification and a high \( R^2 \) indicates that the scheme is well diversified.

**TECHNIQUES OF ANALYSIS**

The collected information was analysed using simple and sophisticated techniques as follows:
**Compound Annual Growth Rate (CAGR)** calculates the growth in variables (number of funds, funds mobilized, assets under management, number of schemes) on a yearly basis.

\[
CAGR = \left[ \left( \frac{P_1}{P_0} \right)^{\frac{1}{n}} - 1 \right] \times 100
\]

\(P_1, P_0, n\) are the variables in the current period, base period and the number of years

**Compound Growth Rate (CGR)** calculates the growth in variables for the entire period of study. CGR is a superior measure of calculating compounded return than simple return with the following formula:

\[
CGR = \left[ \left( \frac{P_n}{P_0} \right)^{\frac{1}{n}} - 1 \right] \times 100
\]

**Rank Correlation** is used when information is sufficient to rank the data. The rank correlation coefficient is a measure of correlation that exists between two sets of ranks. It is a measure of association that is based on the ranks of the observations and not on the numerical values of the data as calculated using the following formula:

\[
R = 1 - \left\{ \frac{6 \sum D^2}{N(N^2-1)} \right\}
\]

\(R\) denotes coefficient of rank correlation

\(D\) refers to the difference of rank between the paired items in two series.
**Kendall’s Coefficient of Concordance** is a non-parametric measure of relationship determining the degree of association among several (k) sets of ranking of N objects.

\[
W = \left\{ \frac{\sum (R_j - \bar{R}_j)^2}{(1/12) k^2 (N^3 - N)} \right\}
\]

k is the number of sets of rankings

N is the number of objects ranked

\(R_j\) is the sum of ranks assigned by all the k judges

\((1/12) k^2 (N^3 - N)\) is the maximum possible sum of the squared deviations

**Chi-square test** is a non-parametric test explaining whether or not two attributes are associated or not, using the following formula:

\[
\chi^2 = \sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}}
\]

\(O_{ij}\) is the observed frequency of the cell in \(i^{th}\) row and \(j^{th}\) column

\(E_{ij}\) is the expected frequency of the cell in \(i^{th}\) row and \(j^{th}\) column

**Z Test** is used to verify the extent of relationship between the market and the scheme using the correlation coefficient with the help of the formula:
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\[
Z_{\text{test}} = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n}
\]

ANOVA (F test) is the analysis of variance used in the case of multiple samples. It is a measure of significance of the difference between the means of factors influencing choice of mutual fund organisation and scheme using the following formula:

\[
Z = \left\{ \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \right\}
\]

Binomial Test of Significance is used to test the probability model to make inference about population proportion from observations satisfying the Bernoulli trials using Z test. The proportion of investors agreeing with the specific attitude statements has been tested using the following formula to identify the attitude towards mutual fund industry in India and the extent of distribution of investors accepting with the specific attitude statements:

\[
Z = \frac{x/n - P}{\sqrt{(p \times q)/n}}
\]

x is the number of respondents agreeing
p, q and n is the proportion of acceptance, non acceptance and number of Bernoulli trials
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The models developed on the assumptions of ‘The Capital Asset Pricing Model’ and tested by Treynor (1965), Sharpe (1966), Jensen (1968) and Fama’s Decomposition of Returns was used to evaluate the performance of selected growth schemes.

**Sharpe Index** \((S_t)\) measures the risk premium of the portfolio with reference to the total amount of risk. The index \(S_t\) measures the slope of the line emanating from risk-free rate outward the portfolio. The larger the \(S_t\), the better the portfolio has performed. \(S_t\) is the reward to variability of the scheme’s total risk and is a summary measure of scheme’s performance adjusted for risk.

\[
S_t = \frac{AR_{pt} - R_f}{\sigma_{pt}}
\]

\(S_t\) = Sharpe Index

\(AR_{pt}\) = Average return on portfolio ‘t’

\(R_f\) = Risk-free rate of return

\(\sigma_{pt}\) = Risk involved in portfolio ‘t’ returns

**Treynor Index** \((T_t)\) sums up the risk and return of a portfolio in a single number. The index measures the slope of the line emanating outward from the risk-free rate to the portfolio under consideration. Treynor index is a reward to volatility of the portfolio. The characteristic line relates the market return to a specific portfolio return without any direct adjustment.
for risk. This line can be fitted through a least square regression involving a single market portfolio. To use Treynor’s measure first the CRL of portfolios are fixed by estimating the following equation:

\[ R_p = a_p + b_p R_m + e_p \]

- \( R_p \) Return on portfolio ‘p’
- \( a_p \) Intercept coefficient for portfolio
- \( b_p \) Portfolio’s beta coefficient
- \( R_m \) Return on market index
- \( e_p \) Random error term for portfolio ‘p’

\[ T_t = \frac{AR_p - R_f}{\beta_p} \]

Jensen constructed a measure of absolute performance on a risk-adjusted basis while Sharpe and Treynor models provided measures for ranking the relative performance of various portfolios on a risk-adjusted basis. Equilibrium average return on a portfolio is the benchmark. Equilibrium average return is the return of the market portfolio for a given systematic risk calculated with the following formula:

\[ \text{EAR}_p = R_f + (R_m - R_f) B_p \]

\( \text{EAR}_p \) is the equilibrium return of the portfolio ‘p’ indicating superior / inferior performance of the portfolio’s alpha (\( \alpha \)). Jensen’s Alpha is the intercept of the CRL. If alpha is positive, the portfolio has performed better and if it is negative, scheme performance is not up to the
benchmark. In a well-diversified portfolio, the average value of alpha of all stocks turns out to be zero.

Eugene Fama’s Decomposition Of Total Returns

Eugene Fama provides for an analytical framework, which enables for a detailed analysis of scheme performance popularly known as Fama’s Decomposition of Total Return. The total return on a portfolio constitutes of risk-free return ($R_f$) and excess return.

The excess return arises from different factors such as risk accepted and stock selection. The excess return can be decomposed into two components, namely risk premium (reward for bearing risk) and for stock selectivity (return from stock selection).

Each portfolio will have both systematic risk and unsystematic risk. Hence risk premium can be decomposed into two components namely, return for bearing systematic risk (market risk) and return for bearing unsystematic risk.

Return for Systematic Risk ($R_1$) = $\beta_p(R_m-R_f)$

Return for Unsystematic Risk ($R_2$) = $[(\sigma_p / \sigma_m) - \beta_p] \times (R_m - R_f)$

The return from pure stock selectivity ($R_3$) is the difference between the actual return and the sum of the other three components. The return for pure (net) selectivity is the additional return obtained by a
portfolio manager for his superior stock selection ability over and above
the return mandated by the total risk of the portfolio.

Fama’s net selectivity = \( R_p - [R_f + (\sigma_p / \sigma_m) \times (R_m - R_f)] \)

Hence, the total return on a fund can be decomposed into four components:

Total return on Portfolio = Risk-Free return (\( R_f \)) + Return for
bearing Systematic risk (\( R_1 \)) + Return for bearing Unsystematic
risk (\( R_2 \)) + Return from pure Stock Selectivity (\( R_3 \))

**Sharpe’s Differential Return**

Sharpe’s Differential Return measures the ability of fund managers
in both security selection and diversifying portfolio. The difference
between the expected return and actual return of the portfolio are called
differential returns. If a portfolio is well diversified, the two measures
(Jensen and Sharpe) indicates same quantum of differential return. In
case the portfolio is not fully diversified, the Sharpe Differential Return
would be small in magnitude than Jensen’s alpha. The difference can be
interpreted as a decline in performance resulting from lack of
diversification. Sharpe’s Differential returns are computed by applying
the following equation to measure the incremental returns earned by the
mutual fund manager for a given level of total risk using the formula:
\[ SDR = R_i - \left\{ R_f + (R_m - R_f) \frac{\sigma_p}{\sigma_m} \right\} \]

**Rank Order Scoring**

In the case of analysis using ranks, the total scores are obtained by way of multiplying the frequency with the weights assigned for each rank. The highest weight is assigned for the first rank and the weights are reduced by one for each successive rank.

**Degree of Safety**

The highest weight has been assigned for the highest degree of safety. The weights are reduced by one for each successive degree of safety thereby assigning the lowest weight (one) for the lowest degree of safety.

**Degree of Satisfaction**

The highest weight has been assigned for the fully satisfied and the weight one is assigned for the not satisfied state of opinion by way of reducing weight by one degree for each successive degree of satisfaction.

**Degree of Importance**

The highest weight has been assigned for very important and the weight one is assigned for not at all important as reduced by one point of weight for each successive degree of importance.
Degree of Agreement

The highest weight of five points was assigned for strongly agreeing and the lowest weight of one point was assigned for strongly disagreeing statement. For each successive degree of agreement one point of differentiation was assigned.

Total scores are arrived by way of multiplying the frequencies with their respective weights. Average scores are calculated by way of dividing the total score by the total number of observations in each case.

The present research work is based on both primary and secondary data. The sampling frame constitutes of the schemes launched in 1993, the year of introduction of SEBI regulations and private sector entry. The study is from 1997, a year after the Indian Mutual Fund Industry came under the uniform regulated environment and upto March 2006. The analysis of the schemes relates to seven short listed schemes for the period March 1998 to March 2006. The primary sampling frame consists of seven fund managers, 20 brokers and 360 investors. The tools like return, risk and risk-free rate of return are used as per Sharpe, Treynor and Jensen Models. The collected information was analysed using simple and sophisticated techniques.