Chapter 8
Analysis of Primary Data

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ANALYSIS OF PRIMARY DATA

32 questionnaire forms received by way of primary data collection was loaded to the SPSS software for the Initial analysis. Overall, there were 18 criteria, which were having an impact on the performance of the Open Ended Equity Schemes of Mutual Fund. However, to come out with a Discriminant Analysis output with all the 18 Criteria would lead to a very lengthy model. To counter the same, the Factor Analysis was used for the data reduction. For the data reduction the feedback was taken from Fund Manager / Assistant Fund Managers / Backup Fund Managers / Research Analysts.

Factor Analysis Results

The Factor Analysis was applied for the identification of the core factors affecting the performance of Mutual Fund Schemes (Open Ended Equity Schemes). This technique was considered appropriate as it requires no pre-existing of functional relationships and is a well known for data reduction. It is used to reduce large number of variables into a few numbers of core factors.

Test Adequacy of Sample

The Kaiser-Meyer-Olkin is the measure of sampling adequacy, which varies between 0 and 1. The values closer to 1 are better and the value of 0.6 is the suggested minimum. The Bartlett's Test of Sphericity is the test for null hypothesis that the correlation matrix has an identity matrix. Taking this into consideration, these tests provide the minimum standard to proceed for Factor Analysis.

Test hypothesis regarding interrelationship between the variables.

Null Hypothesis H_0 : There is no statistically significant interrelationship between variables affecting the performance of Mutual Fund Scheme.

Alternate Hypothesis H_1 : There may be a statistically significant interrelationship between variables affecting the performance of Mutual Fund Scheme.

SPSS Output :

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.702
Bartlett's Test of Sphericity	Approx. Chi-Square	543.556
	Df	153
	Sig.	.000

Normally, 0 < KMO < 1

If KMO > 0.5, the sample is adequate.

Here, KMO = 0.702 which indicates that the sample is adequate and we may proceed with the Factor Analysis.

Bartlett's Test of Sphericity

Taking a 95% level of Significance, α = 0.05

The p-value (Sig.) of .000 < 0.05, therefore the Factor Analysis is valid

As $p < \alpha$, we therefore reject the null hypothesis H_0 and accept the alternate hypothesis (H_1) that there may be statistically significant interrelationship between variable.

The Kaiser-Meyer Olkin (KMO) and Bartlett's Test measure of sampling adequacy was used to examine the appropriateness of Factor Analysis. The approximate of Chi-square is 543.556 with 153 degrees of freedom, which is significant at 0.05 Level of significance. The KMO statistic of 0.702 is also large (greater than 0.50). Hence Factor Analysis is considered as an appropriate technique for further analysis of the data.

Eigen values (Select those components with Eigen Values >= 1)

The initial components are the numbers of the variables used in the Factor Analysis. However, not all the 18 variables will be retained. In the present research only the 4 factors will be extracted by combining the relevant variables. The Eigen values are the variances of the factors. The total column contains the Eigenvalue. The first factor will always account for the most variance and hence have the highest Eigen values. The next factor will account for as much of the left over variance as it can and the same will continue till the last factor. The percentage of variance represents the percent of total variance accounted by each factor and the cumulative percentage gives the cumulative percentage of variance account by the present and the

preceeding factors. In the present research the first 4 factors explain 75.95% of variance.

The rotation sums of the squared loading represent the distribution of the variance after the varimax rotation with Kaiser Normalisation. The varimax rotation tries to maximize the variance of each of the factor.

SPSS Output :

Eigen Values – Total Variance Explained

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.894	43.857	43.857	7.894	43.857	43.857	5.300	29.445	29.445
2	2.883	16.016	59.874	2.883	16.016	59.874	4.215	23.414	52.860
3	1.848	10.269	70.143	1.848	10.269	70.143	2.642	14.679	67.539
4	1.046	5.810	75.952	1.046	5.810	75.952	1.514	8.413	**75.952**
5	.910	5.056	81.009						
6	.883	4.905	85.914						
7	.721	4.004	89.918						
8	.422	2.344	92.263						
9	.292	1.623	93.886						
10	.261	1.453	95.339						
11	.240	1.336	96.675						
12	.165	.919	97.594						
13	.150	.835	98.429						
14	.135	.750	99.179						
15	7.644 E-02	.425	99.604						
16	5.330 E-02	.296	99.900						
17	1.325 E-02	7.362E -02	99.974						
18	4.762 E-03	2.646E -02	100.000						

Extraction Method: Principal Component Analysis.

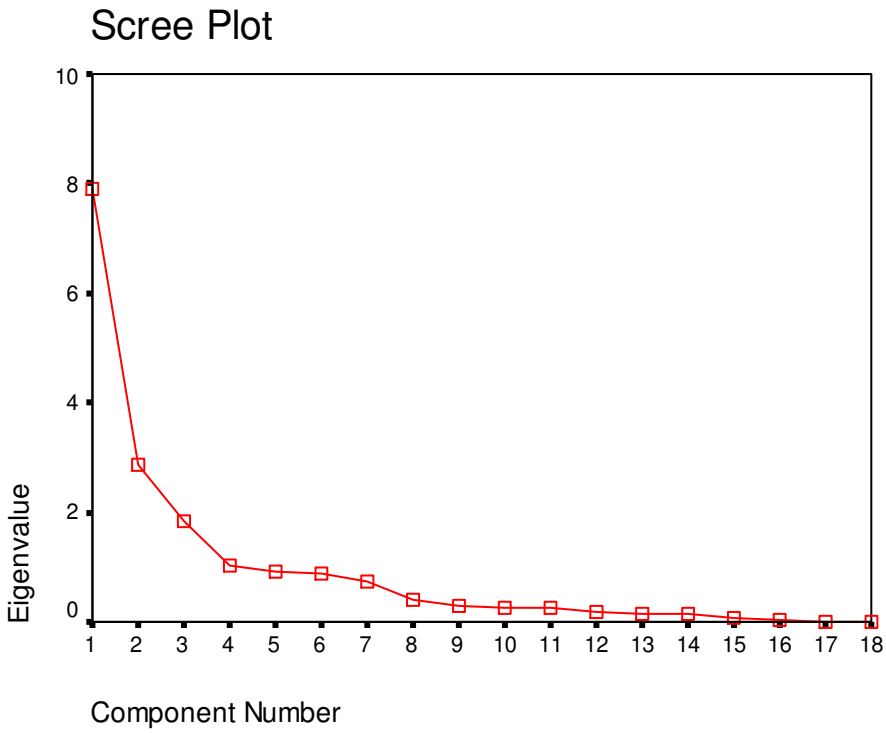
On the basis of Varimax Rotation with Kaiser Normalisation, 4 factors have been extracted. Each factor is constituted of all those variables that have factor loadings greater that 0.5. 18 variables were clubbed into 4 factors. 4

factors were extracted from the 18 variables used in the study. These 4 extracted factors explained 75.95% of the variability the performance of Open Ended Equity Schemes of Mutual Funds. This explains over three-fourth of the variability.

Scree Plot

The scree plot graphs the Eigenvalue against the each factor. We can see from the graph that after factor 4 there is a sharp change in the curvature of the scree plot. This shows that after factor 4 the total variance accounts for smaller and smaller amounts.

SPSS Output :



Identification of the Core Factors

The Rotated Factor Matrix represents the rotated factor loadings, which are the correlations between the variables and the factors. The factor column represents the rotated factors that have been extracted out of the total factor. These are the core factors, which have been used as the final factor after data reduction. According to the grouping of the factors, each group of factors is named which will represent the grouped factor and represent the factors.

SPSS Output :

Rotated Component Matrix(a)

	Component			
	1	2	3	4
Returns of 3 Year Period	-.188	-.241	**.740**	-.256
Mean Return	.307	8.439E-02	**.755**	.267
Standard Deviation of the Returns	-.017	.187	**.711**	-.382
Coefficient of variation of the returns	.255	**.638**	.345	.380
NAV percentage change in the 3 Year Period	.138	-.288	**.755**	.159
Geometric mean of the Excess Return of the Benchmark	7.878E-02	.380	-.042	**.834**
Value at Risk (VAR)	.343	**.579**	.439	.104
Sharpe Index	.166	**.750**	1.133E-02	.292
Modigliani Measure	.490	**.656**	-.112	.117
Information Ratio	.319	**.537**	-.129	.328
Beta Coefficient β	.159	**.721**	-.032	-.235
Treynor Index	.487	**.693**	-.147	.143
Jensen Alpha α Coefficient	.150	**.758**	-.203	.197
Treynor & Mazuy's α Coefficient	**.943**	.257	.105	7.801E-02
Treynor & Mazuy's γ Coefficient	**.908**	.235	9.578E-02	.143
Henriksson & Merton's α Coefficient	**.951**	.196	8.225E-02	6.900E-02
Henriksson & Merton's γ Coefficient	**.936**	.208	.118	5.697E-02
Treynor & Black Appraisal Ratio	**.903**	.293	-.017	-.012

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 9 iterations.

The above matrix gives the correlation of the variables with each of the extracted factors. Usually, each of the variables is highly loaded in one factor and less loaded towards the other factors. To identify the variables, included in each factor, the variable with the value maximum in each row is selected to be part of the respective factor. The values have been highligtened in each of the rows to group the 18 variables into 4 core factors.

Thus, after rotation, Factor 1 accounts for 29.44% of the variance; Factor 2 accounts for 23.42% of the variance; Factor 3 accounts for 14.67% of the variance; Factor 4 accounts for 8.42% of the variance. All the 4 factors together explain for 75.95% of the variance in performance of Open Ended Equity Scheme.

Name of the four core factors

The variables that have been included into each core factor have been named as under: -

Table 8 : Name of the four core factors

Factor	Variables Included	Name of the Factor
1	• Treynor & Mazuy's α Coefficient • Treynor & Mazuy's γ Coefficient • Henriksson & Merton's α Coefficient • Henriksson & Merton's γ Coefficient • Treynor & Black Appraisal Ratio	**Stock Selection & Timing**
2	• Coefficient of Variations of the Returns • Value At Risk (VAR) • Sharpe Index • Modigliani Measure • Information Ratio • Beta Coefficient (β) • Treynor Index • Jensen Alpha α Coefficient	**Risk Management**
3	• Returns of 3 Year Period • Mean Return • Standard Deviation of the Returns • NAV percentage change in the 3 Year Period	**Existing Returns of the Schemes (At Beginning)**
4	• Geometric Mean of the Excess Return over the Benchmark	**Excess Return over Benchmark (At Beginning)**

Conclusions of Factor Analysis

The Factor Analysis has thus identified 4 core factors that affect the performance of the Open Ended Equity Schemes. They can be categorized as under: -

1 Stock Selection and Timing

2 Risk Management

3 Existing Returns of the Schemes (At Beginning)

4 Excess Return over the Benchmark (At Beginning)

The above factors have been discussed in detail as under: -

Factor 1 – Stock Selection and Timing

This factor suggests the market timing skill and security selection ability of the Fund Managers. The first factor explains 29.44 % of the variability on the performance of the Open Ended Equity Scheme. It is necessary for the Fund Managers to have a superior Market Timing Skill and the Security selection ability to out performance the benchmark. Similarly, this is the core factor, which contributes to the performance of an Open Ended Equity Scheme.

Factor 2 – Risk Management

The second factor relates to the market risk management. This factor explains 23.42% of the variability on the performance of the Open Ended Equity Scheme. Equity Schemes are more risky and depends on the stock markets for its performance. Thus the Fund Managers have to obviously take care of the market risk management.

Factor 3 – Existing Returns of the Scheme (At Beginning)

The third factor characterizes the existing returns of the Open Ended Equity Scheme. It is always said that those schemes, which perform better, tend to perform better in the future. This factor explains 14.67% of the variability on the performance of the Open Ended Equity Scheme.

This result is in conformity with that of Hendricks *et al*, 1994, Brown and Goetzman, 1995 who have found evidence supporting the idea that past performance is related to future performance.

Factor 4 – Excess Return over the Benchmark (At Beginning)

The fourth factor characterizes the excess return over the benchmark. This factor explains 8.42% of the variability on the performance of the Open Ended

Equity Scheme. An Open Ended Equity Scheme has to outperform the Benchmark and generate higher returns than the Benchmark so that its performance is better.

A total of 4 core factors extracted from the 18 variables, explains 75.95% of the variability of the performance of the Open Ended Equity Schemes.

Table 9 : Identification of Variables related factors in Variables Selection

Factor Name	Variables Included	Factor Loading
Stock Selection & Timing	• Treynor & Mazuy's α Coefficient • Treynor & Mazuy's γ Coefficient • Henriksson & Merton's α Coefficient • Henriksson & Merton's γ Coefficient • Treynor & Black Appraisal Ratio	**.972** .909 .954 .937 .901
Risk Management	• Coefficient of Variations of the Returns • Value At Risk (VAR) • Sharpe Index • Modigliani Measure • Information Ratio • Beta Coefficient (β) • Treynor Index • Jensen Alpha α Coefficient	.735 .656 .676 .697 .514 .601 **.760** .677
Existing Returns of the Schemes (At Beginning)	• Returns of 3 Year Period • Mean Return • Standard Deviation of the Returns • NAV percentage change in the 3 Year Period	.707 **.743** .687 .697
Excess Return over Benchmark (At Beginning)	• Geometric Mean of the Excess Return over the Benchmark	**.848**

Based on above factor loadings, the variables within each extracted factor were identified for further Discriminant Analysis. This data was framed into a Discriminant Model to generate a predictive evaluation for the performance of the Open Ended Scheme based on the selected coefficients / variables values.

Analysis of Part B of the questionnaire viz Factor that Lower Risk

The Part B of the questionnaire was on the factors that lower risk vis-à-vis the systematic risk and the unsystematic risk. The same scale of 1 to 6 was considered to rate these two factors of the total risk of a portfolio.

It is useful in balancing portfolio to distinguish between two sources of risk: market risk or systematic risk on the one hand and appraisal or insurable risk on the other. In general it is not correct to assume that optimal balancing leads either to negligible levels of appraisal risk or to negligible level of market risk (Treynor Jack & Black Fisher).

The total risk in a portfolio can be expressed as under: -

Total Risk = Systematic Risk + Unsystematic Risk

Systematic Risk

The systematic risk is also referred to as the market risk and cannot be diversified. It refers to the movement of the whole market. Even if the Fund Manager has a perfectly diversified portfolio, there is a risk, which cannot be avoided, and this is known as the systemic risk. The systemic risk is not the same for all the securities or portfolio.

Unsystematic Risk

Unlike the systematic risk, the unsystematic risk is a specific risk, specific to the company or industry that is inherent in each investment. The unsystematic risk can be reduced through proper diversification. This is also referred to as the non-market risk. This risk is specific to a particular security and is associated with factors like the business and financial risk.

There was 18.75% mortality from the Part A of the questionnaire to the Part B of the questionnaire. There was 81.25% of feedback from the respondent. As the response rate was high, it was felt that we may proceed with the descriptive analysis of the data.

This data was again framed on the SPSS software for further analysis and interpretation. The descriptive statistics was used to analyse the data

collected in the part B of the questionnaire in the primary data. There were two attributes in this data viz factor that lower risk viz the Systematic Risk and the Non Systematic Risk.

SPSS Output : Descriptive Analysis

Statistics

		Systematic Risk	Non Systematic Risk
N	Valid	26	26
	Missing	6	6
Mean		2.9615	2.9615
Median		3.0000	3.0000
Mode		2.00	1.00
Sum		77.00	77.00

The N value gives the Valid and Missing number of the valid observations for the variables. In the present observations out of the 32 feedbacks, the respondent gave 26 feedback and 6 of the respondent did not give the feedback. The mean value viz the arithmetic mean across the observation for the systematic and non-systematic means is the most widely used central tendency. The mean for both these criteria has come out to be exactly 2.9615, as the central tendency, which connotes that both the systematic risk and the non-systematic risk are equally important factor after lower risk, which has to be considered for the portfolio.

Going by the mode weightage, however it was felt at the systematic risk is a marginal important factor that has to be considered to lower risk of the portfolio.

Analysis of Part 'C' of the questionnaire viz Other Useful Inputs or Remarks

The questionnaire was a semi structured questionnaire wherein the part 'C' of the questionnaire was on any other useful inputs or remarks that the Fund Managers would like to contribute towards the present research. There were few feedback, which was related to the present research. The feedback have been capsulated as under:

- The returns of 1 year, 2 years, 5 years (are important for performance).
- Other qualitative factor are also important in terms of Portfolio concentration – large cap – small cap – mix etc
- The list was exhaustive (For the data collection)
- Primarily performance is relative to peer group is the key.
- Don’t diversify too much across Sectors.
- High Portfolio trading volume indicates lack of clarity.
- What is largely seen is returns of the funds vis-à-vis Benchmark depends on the market psychi – sometimes preference for large cap /

mid cap / small cap will influence returns or sector preference would influence it more than any other logical / mathematical measure.

- Consistency in the funds performance should also be looked into. The fund which outperforms both in a rising & falling market should be preferred.

All the above input on performance was considered as valid in context to the present research. Largely, it has been seen that the existing returns have been considered as the influential factor for the future performance of the scheme. The returns over a benchmark / peer group was the factor which was considered as the primarily performance. In the present research, the benchmark was taken as the BSE Sensex, which again endorses the views expressed by the Fund Managers. Consistency in the funds performance was also a factor to be looked into, the mean return however gives the mean of the 3 years and therefore these views were also taken care in the present research.