

An Empirical Evaluation of Select Mutual fund Styles Through Cluster Analysis

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ABSTRACT - A developed financial market is critical to overall economic development, and mutual funds play an active role in promoting a healthy capital market. Mutual funds are the fastest growing institutions in savings sector. Growing complications and risks in the stock market, rising tax rates and increasing inflation have pushed investors towards investments in mutual funds. A variety of mutual funds have witnessed the Indian market where an investor can form a highly diversified portfolio. So, an attempt is made to evaluate different investment styles through Cluster Analysis which helps the investors to minimize their risk and maximize their return.

Key words : Cluster Analysis ,Mutual Funds, Performance Evaluation, Risk , Return, Sharpe ratio, Treynor ratio.

I. INTRODUCTION

The active involvement of mutual funds in promoting economic development can be seen not only in terms of their participation in the savings market but also in their dominant presence in the money and capital market. A developed financial market is critical to overall economic development, and mutual funds play an active role in promoting a healthy capital market. Mutual funds increase liquidity in the money market.[1] The assets holding pattern of mutual funds in the USA indicates the dominant role of the mutual funds in the money and capital market.

II. REVIEW OF LITERATURE

Sondhi and Jain (2010) examined the market risk and investment performance of equity mutual funds in India. The study used a sample of 36 equity fund for a period of 3 years. The study examined whether high beta of funds have actually produced high returns over the study period and revealed that, the category, size and ownership have been significant determinants of the performance of mutual fund schemes.

Kalpesh, Mahesh (2012) evaluated the performance of Indian mutual funds through relative performance index, risk-return analysis, Treynor's measures, Sharpe's measure, Jensen's measure and Fama's measure. The results of performance measures suggest that most of the mutual fund have given positive return during 2007 to 2011.

Nanadhagopal, Varadharajan, Ramya, (2012) in their article opined that, in the past few years Mutual Fund has emerged as an effective tool for ensuring one's financial well being.

Poornima, S. (2013) attempted to analyze about the performance of the growth oriented equity diversified schemes by using Sortino ratio. 102 growth oriented equity diversified schemes which were performing during the period April 2006 to March 2011 were selected for the

study. The analysis using Sortino ratio depicts that out of 102 funds, 97 funds were able to produce return more than minimum acceptable rate of return. Whereas 5 funds were found to produce return less than minimum acceptable rate of return. It also revealed the fact that careful evaluation using appropriate performance measure will lead the investor in selecting the best funds.

Ashraf SH, Sharma D (2014) made an attempt to analyse the performance of equity mutual funds industry against risk free rate and benchmarks return over the five years samples consisting 10 growths oriented- open ended- equity mutual fund schemes belonging to 5 public and 2 private mutual fund companies. These funds are also observed to have high R^2 values (Coefficient of Determination) indicating the better diversification of the fund portfolio.

G.Brindha(2014) made an attempt to present a theoretical view on performance evaluation of mutual funds as Ultimately, it is important for an investor to study the risk and return involved in an investment, through which the investor can gain valuable information before investing in any mutual funds.

Mili Kar, Parag Shil (2015) evaluated the performance of 40 debt oriented open ended schemes having corresponding growth and dividend options. The empirical results reported that the variance of only 17.5 percent of total schemes was explained completely by the market and in overall, NSE G-Sec Composite Index outperformed the scheme returns. The study concludes there was no significant difference exists between Schemes Returns and NSE G-Sec Composite Index Returns.

III. RESEARCH METHODOLOGY

1.1 RESEARCH OBJECTIVES

- To determine the risk for the select mutual fund schemes through standard deviation, variance and systematic risk.
- To compare the returns provided by the individual Mutual Fund schemes and the risk levels with their market and risk free rates .
- To understand how an investor with inadequate knowledge and an urge for investment can diversify his investment in mutual funds across various sectors and styles or objectives through Cluster Analysis.

1.2 DATA AND METHODOLOGY

The required data for the present study was secondary in nature. A sample of 1500 schemes were selected for the present study. The selection of the schemes were made on the basis of the membership in NIFTY from June 2010 to June 2016. Out of them, the schemes which were not in operation and whose NAV is less than zero were eliminated. Finally the researcher was left with 581 schemes belonging to 17 investment styles .The risk-free rate was 7%, the implied yield on the month-end auction of 91-day Treasury Bills which was collected from RBI website. NIFTY was taken as Benchmark Index [2].

3.2.1 RETURN

To compare the returns provided by the individual Mutual Fund schemes and the risk levels with their market and risk free rates through risk-return analysis. For this monthly returns were calculated using daily NAVs for the sampled companies by using the following formula

$$R_{j,t} = \frac{NAV_t - NAV_{t-1}}{NAV_{t-1}} \times 100$$

Where

Rt = Daily return of a mutual fund in the period t

NAVt = Daily net asset value per unit of the mutual fund in the period t

Return alone should not be considered as the basis of measurement of the performance of a mutual fund scheme, it should also include the risk taken by the fund manager because different funds will have different levels of risk attached to them. Risk associated with a fund, in a general, can be defined as variability or fluctuations in the returns generated by it. The higher the fluctuations in the returns of a fund during a given period, higher will be the risk associated with it. These fluctuations in the returns generated by a fund are resultant of two guiding forces.

3.2.2 RISK

The total risk of the mutual funds under consideration is measured by the standard deviation of the daily returns which was calculated as follows

STANDARD DEVIATION

$$S = \sqrt{\frac{1}{n-1} \sum_{t=1}^n (R_t - \bar{R})^2}$$

Where,

S = Standard deviation (total risk) of the mutual fund

n = Number of daily returns

R_t = Daily returns of the mutual fund

\bar{R} = Mean return of the mutual fund

3.2.3 Treynor Measure

This Index is a ratio of return generated by the fund over and above risk free rate of return (generally taken to be the return on securities backed by the government, as there is no credit risk associated), during a given period and systematic risk associated with it (beta).

Symbolically, it can be represented as [4]

$$\text{Treynor's Index (Ti)} = T = \frac{SR - R_f}{\beta_s}$$

Where, SR represents average return on the scheme, R_f is risk free rate of return and β_s is beta of the scheme. While a high and positive Treynor's Index shows a superior risk-adjusted performance of a fund, a low and negative Treynor's Index is an indication of unfavorable performance.

3.2.4 Sharpe Measure

In this model, performance of a fund is evaluated on the basis of Sharpe Ratio, which is a ratio of returns generated by the fund over and above risk free rate of return and the total risk associated with it. According to Sharpe, it is the total risk of the fund that the investors are concerned about. So, the model evaluates funds on the basis of reward per unit of total risk.

Symbolically, it can be written as

$$\text{Sharpe Index (Si)} = S = \frac{SR - R_f}{\sigma_s}$$

Where

SR = Scheme returns

R_f = risk free returns

σ_s = Standard deviation of the returns

While a high and positive Sharpe Ratio shows a superior risk-adjusted performance of a fund, a low and negative Sharpe Ratio is an indication of unfavorable performance.

3.2.5 Jensen Measure

This measure involves evaluation of the returns that the fund has generated vs. the returns actually expected out of the fund given the level of its systematic risk. The surplus between the two returns is called Alpha, which measures the performance of a fund compared with the actual returns over the period.

Required return of a fund at a given level of risk (B_i) can be calculated as

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + \varepsilon_i$$

R_i = Return of the security (mutual fund) i

R_f = Risk – free return

α_i = Risk – adjusted excess return of the mutual fund i

β_i = Beta of the mutual fund i

R_m = Return of the market portfolio

ε_i = Deviation or errors around the regression line

3.2.6 Cluster analysis

To understand how an investor with inadequate knowledge and an urge for investment can diversify investment in mutual funds across sectors and styles or objectives cluster analysis was used. The total 581 funds were formed into four clusters using Ward's method[3].

- ✓ CLUSTER 1 contains 182 funds
- ✓ CLUSTER 2 contains 73 funds
- ✓ CLUSTER 3 contains 174 funds
- ✓ CLUSTER 4 contains 152 funds

Each cluster formed was evaluated in terms of Risk, return, sharpe, treynor and Jensen's measures and results were interpreted.

IV. RESULTS AND DISCUSSIONS

Brief description of Clusters

A total of 581 funds were taken for the study, which were divided into 4 clusters .

Cluster 1 consists of 11 balanced funds, 112 debt funds, 26 equity funds, 5 gilt funds, 9 hybrid funds and 19 money market funds and a total of 182 funds.

Cluster 2 consists of 2 balanced funds, 30 debt funds, 34 equity funds, 2 gilt funds, 2 hybrid funds, 3 money market funds and a total of 73 funds.

Cluster 3 consists of 3 balanced funds, 84 debt funds, 51 equity funds, 7 gilt funds, 9 hybrid funds, 20 money market funds and a total of 174 funds.

Cluster 4 consists of 3 balanced funds, 91 debt funds, 28 equity funds, 9 gilt funds, 1 hybrid fund, 20 money market funds and a total of 152 funds.(table-1)

- All 581 mutual funds were classified into four cluster centers out of which Cluster 1 is the largest cluster with

182 mutual funds which have the following parameters – Returns 2.11, Risk 0.05, Sharpe -1.71, Treynor 0.38, Jensen -0.04 and risk by return 3.13. The next largest cluster was Cluster 3 with the following parameters: Returns 7.12, Risk 0.07, Sharpe 0.08, Treynor 0.0011, Jensen 0.0019 and risk by return 1.07. Next comes the cluster 4 which has 152 funds and the parameters in this cluster are Returns 8.49, Risk 0.06, Sharpe 0.48, Treynor -0.14, Jensen 0.011 and risk by return 0.73. Cluster 2 have 73 funds and the parameters for the clusters are Returns 4.62, Risk 0.10, Sharpe -0.37, Treynor -0.04, Jensen -0.01 & risk by return 2.20. Risk was highest in cluster 2 and this shows that the mutual funds in this cluster have high risk. Risk by return variable was highest in cluster 1 indicating that mutual funds in this category assume more risk to generate returns. Treynor ratio was highest in cluster 1 indicating that the funds in this cluster have performed better. Returns, Sharpe ratio and Jensen ratio were highest in cluster 4 indicating better returns.(table-2)

- It was found that when all 581 funds are formed into four clusters, Treynor ratio is highest in cluster 1 indicating that the funds in this cluster have performed better returns, Sharpe ratio and Jensen ratio were highest in cluster 4 indicating better returns.(table-2)

V. CONCLUSION

The Indian capital market having a long history spanning over a century has passed through the most radical phases. It has witnessed extraordinary developments and innovations during the nineties. One such development was the improved role of the mutual funds in financial intermediation. Mutual funds in India have fast emerged as an important instrument of household savings [5]. Due to the flexibility and variety available in them they have the potential to rival traditional money saving instruments by attracting household sector or retail investor's savings. There is an urgent need for aggressive campaign to train the investor about different mutual fund schemes. Mutual Funds should published NAVs of their different schemes as frequently as possible. The mutual fund companies should improve the service level to attract more and more investors.

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ANNEXURES

Table 1 Performance Evaluation through Cluster Analysis

Cluster No	No of Mutual Funds from each Category	No of Mutual Funds from each Investment Styles
1	Balanced - 11 Debt - 112 Equity - 26 Gilt - 5 Hybrid - 9 Money Market - 19	Balanced – 11
		Debt Long Term – 52
		Debt Shor Term -60
		Equity Diversified – 8
		Equity Index – 1
		Equity Tax Savings – 3
		Equity Infrastructure -3
		Equity Largecap -6
		Equity Others - 4
		Equity Small amd Midcap - 1
		Gilt Longterm – 4
		Gilt Shortterm – 1
		Hybrid – 9
		Money Market – 19
Total Mutual Funds	182	182
2	Balanced - 2 Debt - 30 Equity - 34 Gilt - 2 Hybrid - 2 Money Market - 3	Balanced – 2
		Debt Long Term – 10
		Debt Shor Term -20
		Equity Diversified – 7
		Equity Institutional – 1
		Equity Tax Savings – 5
		Equity Infrastructure -1
		Equity Largecap -9
		Equity Others – 8
		Equity Small amd Midcap – 2
		Equity Speciality – 1
		Gilt Longterm – 2
		Hybrid – 2
		Money Market – 3
Total Mutual Funds	73	73
3	Balanced - 3 Debt - 84 Equity - 51 Gilt - 7 Hybrid - 9 Money Market - 20	Balanced – 3
		Debt Long Term – 56
		Debt Shor Term -28
		Equity Diversified – 18
		Equity Index – 1
		Equity Tax Savings – 4
		Equity Infrastructure -2
		Equity Technology – 2

Cluster No	No of Mutual Funds from each Category	No of Mutual Funds from each Investment Styles
		Equity Largecap -11
		Equity Others – 10
		Equity Small amd Midcap – 3
		Gilt Longterm – 6
		Gilt Shortterm – 1
		Hybrid – 9
		Money Market – 20
Total Mutual Funds	174	174
		Balanced – 3
		Debt Long Term – 57
		Debt Shor Term -34
		Equity Diversified – 10
		EqUity Tax Savings – 5
		Equity Infrastructure -4
		Equity Largecap -3
		Equity Others – 6
		Gilt Longterm – 8
		Gilt Shortterm – 1
		Hybrid – 1
		Money Market – 20
Total Mutual Funds	152	152

Table 2 Summarised Results of Cluster Analysis

Variables	Cluster			
	1	2	3	4
Returns (%)	2.11371	4.628001	7.122003	8.496174
Risk	0.05908	0.102551	0.073951	0.062882
Sharpe	-1.71508	-0.37437	0.087052	0.486371
Treynor	0.381762	-0.04175	0.001165	-0.14233
Jensen	-0.04265	-0.01339	0.001964	0.011896
Risk/Return	3.13389	2.207844	1.075753	0.737515
Number of Cases in each Cluster	182	73	174	152