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Research Article

Expense management of mutual funds schemes in India

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Abstract: *This study highlights a* ***paradigm shift*** *in performance evaluation of Indian mutual funds schemes by focusing on* ***efficiency in expense management alongside total returns.*** *By using advanced techniques like DEA and Tone's method, the research broadens the understanding of mutual fund performance in India, offering a valuable framework for both investors and industry stakeholders. Findings of the study revealed that only 6% of the schemes under consideration are the best performers among all the schemes of the sample as they have managed the operating costs efficiently during the period under consideration. This is not an encouraging finding in respect of the Indian mutual funds industry as a whole.*

Keywords: *Mutual funds; Performance evaluation; Data envelopment analysis (DEA); Cost efficiency*

1. Introduction

Expense management in mutual funds industry is a widely discussed issue in the developed capital markets, particularly in the US and Europe. However, due to overemphasis on total return such issue remains less important for Indian mutual funds industry. The importance of costs or expenses are not properly addressed in various official documents on mutual funds and investors also focus mainly on total earnings of a scheme. But total earnings of a scheme cannot be a good indicator of managerial efficiency. The efficiency of managers should be evaluated apart from risk-adjusted measures in terms of operating costs or expenses of the fund. If the operating costs or expenses are not managed efficiently a large part of the return will be used up in the management operation and ultimately investors' net return will be less. Hence, expense management or efficiency in managing operating costs is a crucial factor in performance evaluation of mutual funds in India. This is why an attempt has been made in this study to evaluate the cost efficiency of sample mutual funds schemes using a non-parametric framework known as Data Envelopment Analysis (DEA).Further, in DEA framework, to tackle the trivial assumption of identical input prices for all firms of the Farrell model and also to internalize the conceptual as well as calculation problems of input and output quantities of the financial sector this study has applied the new cost efficiency method advocated by Tone [1]. Consequently, it has provided an opportunity to reach a broad-based judgment relating to mutual funds performance.

To the best of our knowledge this is the earliest implementation of the cost efficiency analysis of Indian equity mutual funds in a non-parametric framework while evaluating their performance.

The rest of the paper is organised as follows. Section 2 deals with the literature on cost efficiency in the non-parametric framework. Section 3 describes the data and methodology used in this study. Section 4 elaborates the results of the empirical analysis and finally, Section 5 concludes.

2. Related Literature

One of the earliest attempts towards performance evaluation of managed portfolios in the non-parametric framework was made by Murthi, Choi, and Desai [2] who put forward a portfolio performance measurement method based on DEA called DEA portfolio efficiency index (DPEI). Using standard deviation and transaction loads as inputs and excess return as output this study investigated performance of 2083 mutual funds in the third quarter of 1993.In the first phase of empirical analysis, they compared the DPEI measure with traditional measures of performance corresponding to 731 mutual funds belonging to seven categories: aggressive growth, asset allocation, equity-income, growth, growth-income, balanced and income. In the second phase, they used all 2083 mutual fund for computing DPEI for each fund. They also used a regression analysis to test for the source of variation in efficiency.

Basso and Funari [3] used several risk measures (standard deviation, standard semi-deviation and beta) as well as subscription and redemption costs as inputs and the mean return and the fraction of periods in which the mutual fund was non-dominated as outputs. They proposed two DEA measures for the evaluation of performance. In the first measure mutual fund return has been taken as the output and the standard deviation and transaction cost have been taken as the inputs. In the second DEA measure they built a stochastic dominance indicator which reflects both the investors' preference structure and the time occurrence of returns assigning a higher score to mutual funds which are not dominated by other mutual funds in the higher number of sub-periods. The results indicated that DEA methodology for evaluating mutual funds performance may complement the traditional methods. In a later study [4] Basso and Funari used an ethical score of mutual funds in place of the stochastic dominance indicator.

In a study on 257 Australian mutual funds, Galagedera and Silvapulle [5] used data envelopment analysis (DEA) to measure the relative efficiency of the sample mutual funds. It also applied logistic regression for examining the dependence of efficiency on fund attributes, management strategy and the operating environment. In general, the study revealed that the overall technical efficiency and the scale efficiency were higher for risk-averse funds with high positive net flow of assets.

In an illuminating paper Tone [1] pointed out the shortcomings of the cost and allocative efficiencies used so far in the DEA literature and proposed an alternative approach to the cost efficiency evaluation known as new cost efficiency measure. Tone argued that Farrell [6] measure of cost efficiency is based on the premise that all the producers face same input prices. If this is not the case then the Farrell measure may not provide correct estimation of cost efficiency. However, it is quite unusual that unit costs of inputs such as labour, capital and raw materials are identical for all the producers. To overcome this problem, he suggested to minimize money value of the inputs used instead of the product of physical quantities of the inputs and their respective prices.

Sengupta [7] developed a set of nonparametric tests which included the convex hull method and the stochastic dominance criteria for evaluating the performance of mutual fund portfolios. His study focused on four major groups of funds. The empirical results supported the hypothesis that some groups of funds based on new technology tend to outperform the others.

Santos et.al. [8] evaluated the performance of 307 Brazilian stock mutual funds employing stochastic frontiers. They listed managed funds and the bottom ten for the period April 2001−July 2003 and showed that a fund's efficiency increases with management skill to beat the market. They also found that portfolios with low volatility tend to be more efficient. Yet they did not find any significant relationship between fund size and performance, though this might be blurred by a survivorship bias.

Gregoriou, Sedzro, Zhu [9] used DEA to appraise the performance of 168 hedge funds for the period 1997-2001.They initially used the Banker, Charnes and Cooper (BCC) model to classify the hedge funds into efficient and inefficient categories. Then they used cross efficiency and super-efficiency models to further analyse the efficiency of funds.

Using the Morningstar database of mutual funds, Daraio and Simar [10] evaluated the performance of six categories of mutual funds (asset allocation, aggressive growth, balanced, equity income, growth and growth income) in terms of conditional input-oriented order-m efficiency, Free Disposal Hull (FDH) method and DEA, Jensen's αand Sharpe Index. The results indicated that while indicators based on nonparametric and robust approaches (DEA, FDH, order-*m*) are highly positively correlated, they are weakly correlated with the traditional indicators (Sharpe ratio and Jensen's alpha).

Tone and Sahoo [11] applied the new cost efficiency model [1] to examine the performance of Life Insurance Corporation of India (LICI). They have examined the performance trends of Life Insurance Corporation of India for the period 1982-83 through 2000-01. The findings showed a significant heterogeneity in the cost efficiency scores (overall and scale efficiencies) over the course of 19 years. More importantly, there had been a downward trend in performance, measured in terms

of cost efficiency, since 1994-95. This decline was due to the huge initial fixed cost of modernizing their operations. Results from a sensitivity analysis were in broad agreement with the main findings of this study.

Sinha [12] estimated cost efficiency of the life insurance companies operating in India for the period 2005-06 to 2009-10 using Farrell and Tone's measure. In both the approaches this study found that the mean cost efficiency exhibits significant fluctuations during the period under observation implying significant divergence from the frontier. The study also decomposed the Farrell measure of cost efficiency into input oriented technical efficiency and allocative efficiency. Further the cost efficiency estimates were related (through a censored Tobit model) to product and channel composition of the in-sample insurance players.

Premachandra et al. [13] decomposed the overall mutual fund management process into operational management and portfolio management sub-processes. They focussed on overall performance and its decomposition at the sub-process level as valuable information to fund managers as it would help them to understand how they performed relative to their peers.

In a study in 2018, Galagedera et al. [14] adopted a new network DEA model for performance appraisal of mutual funds in U.S. They argued that mutual fund management process should be sub divided into a three-stage process with operational management, resource management, and portfolio management as the sub-processes. However, the network structures proposed in Premachandra et al. [13], Galagedera et al. [14] and Sánchez-González et al. [15] for mutual funds performance appraisal are conceptually different.

In another study Galagedera et al. [16] developed a network data envelopment model to evaluate mutual funds performance from disbursement management perspective. Using a sample of 1,706 U.S. equity mutual funds, the study concluded that disbursement management performance relative to their peers (disbursement efficiency) is generally poor.

Vidal-Garcia et al. [17] attempted to figure out the association between risk- adjusted mutual funds performance and expenses using the Carhart [18] four- factor model (a parametric approach). They also used DEA to ascertain the relation between performance and costs through input slacks. The study found that the parametric approach and the non-parametric approach produce contrasting results.

3. Data and Methodology

3.1. Data

This study started with a database of 404 equity schemes. However, majority of those schemes disappeared within the period of study. Besides, cost related data are available for 62 schemes only. Hence, the present study uses a sample of 62 mutual fund schemes. The details of these schemes are given in Table 1.

Table 1: List of Sample mutual fund schemes

Sl. No.	Name of the Scheme	Objective
1.	Baroda Pioneer ELSS 96	ELSS
2.	Birla Sun Life Advantage Fund	G
3.	Birla Sun Life buy India Fund	G
4.	Birla Sun Life Equity Fund	G
5.	Birla Sun Life MNC Fund	G
6.	Birla Sun Life New Millennium	G
7.	DSP BlackRock Opportunities Fund	G
8.	DSP BlackRock Technology.com Fund	G
9.	Escorts Tax Plan	ELSS
10.	Franklin India Bluechip	G
11.	Franklin India Opportunity Fund	G
12.	Franklin India Prima Fund	G
13.	Franklin India Prima Plus	G
14.	Franklin India Taxshield	ELSS
15.	Franklin Infotech Fund	G
16.	HDFC Equity Fund	G
17.	HDFC Growth Fund	G
18.	HDFC Taxsaver	ELSS
19.	HDFC Top 200	G
20.	ICICI Prudential FMCG	G
21.	ICICI Prudential Taxplan	ELSS
22.	ICICI Prudential Top 100 Fund	G
23.	ICICI Prudential Top 200 Fund	G
24.	ICICI Prudential Technology Fund	G
25.	ING Core Equity Fund	G
26.	JM Basic Fund	G
27.	JM Equity	G
28.	L&T Opportunities Fund	G
29.	LIC Nomura Equity Fund	G

Sl. No.	Name of the Scheme	Objective
30.	LIC Nomura MF Growth Fund	G
31.	LIC Nomura Tax Plan	ELSS
32.	PRINCIPAL Index Fund	G
33.	PRINCIPAL Growth Fund	G
34.	Reliance Growth	G
35.	Reliance Vision	G
36.	Sahara Taxgain	ELSS
37.	SBI Magnum Equity Fund	G
38.	SBI Magnum Global Fund 94	G
39.	SBI Magnum Multiplier Plus 93	G
40.	SBI Magnum Sector Funds Umbrella – Contra	G
41.	SBI Magnum Sector Funds Umbrella – Pharma	G
42.	SBI Magnum Tax Gain Scheme 93	ELSS
43.	Sundaram Growth Fund	G
44.	Sundaram Taxsaver	ELSS
45.	Tata Ethical Fund	G
46.	Tata Life Sciences and Technology Fund	G
47.	Tata Pure Equity Fund	G
48.	Tata Tax Saving Fund	ELSS
49.	Taurus Bonanza Fund	G
50.	Taurus Discovery Fund	G
51.	Taurus Starshare Fund	G
52.	Taurus Taxshield	ELSS
53.	Templeton India Growth Fund	G
54.	UTI Energy Fund	G
55.	UTI Equity Fund	G
56.	UTI Equity Tax Savings Plan	ELSS
57.	UTI Masterplus Unit Scheme 91	G
58.	UTI MNC Fund	G
59.	UTI Pharma and Healthcare Fund	G
60.	UTI Nifty Fund	G
61.	UTI Top 100 Fund	G
62.	UTI Services Industries Fund	G

Where, G: Growth, and ELSS: Equity linked savings scheme

Source: Constructed by Author

Out of these schemes the sample comprises of 50 growth schemes and 12 equity linked savings schemes (ELSS). The data used in the study mainly comprise of monthly net asset values (NAV) for the 62 mutual funds schemes during May 2000 to March 2012. These NAV data are collected from www.mutualfundsindia.com . Besides, the data on expense ratio and portfolio turnover ratio are collected from www.mutualfundsindia.com. In this framework the study has used portfolio turnover ratio and expense ratio as two inputs and monthly return as output.

3.2. Methodology

The analytical part of this study tries to measure the efficiency of the sample mutual funds schemes in terms of new cost efficiency model of Tone [1] using Data envelopment analysis (DEA). In this framework the study has used portfolio turnover ratio and expense ratio as two inputs and monthly return as output.

At the outset, the returns for each of the sample schemes have been computed by using the following equation:

$$Rt = (NAVt – NAVt -1 + Dt) / NAVt - 1 \quad (1)$$

Where, NAVt = Net asset value of the scheme at the end of the month t Dt = Dividend paid during the month t.

3.2.1. Cost efficiency based on Data Envelopment Analysis (DEA)

Cost efficiency of a firm or a decision-making unit is an important indicator of its performance. The cost efficiency of a firm is defined by the ratio of minimum costs to actual costs for a given output vector and is computed by measuring the distance of its observed (cost) point from an ideal cost frontier. The concepts of cost and allocative efficiencies were first introduced by Farrell [6], and then developed by Fare, Grosskopf and Lovell [19] by using linear programming techniques.

3.2.2. The Farrell Approach

Suppose there are r inputs and s outputs for each of the n firms. The i- th firm (i=1, 2, …, n) uses a r x 1 input vector xi= (x1, x2, …, xr) to produce as s x 1 output vector yi = (y1, y2, ..., ys) where X is a r x n input matrix and Y is a s x n output matrix that represent data for all n sample firms. The underlying production possibility set is given by:

$$P= \{(x, y) | x \geq X\lambda, y \leq Y\lambda, \lambda \geq 0, \Sigma \lambda = 1 \ldots\ldots (2)$$

Where X and Y indicate the input and output vectors respectively defined in physical terms. Estimation of cost efficiency thus requires information about

input prices. When input prices are available, estimation of cost efficiency involves a two-step process. In the first step, with a variable return to scale, the following linear programming problem (LP) is solved:

Min $\omega_i x_i^*$ s.t. $x_i \geq X\lambda$, $y_i \leq Y\lambda$, $\lambda \geq 0$, $\Sigma\lambda = 1$ …… (3)

where, ωi is a r x 1 input price vector for the i-th firm which corresponds to the input vector xi, and xi* is the cost-minimizing input vector for the i-th firm which is obtained by the LP.

In the second step, the cost efficiency of the i-th firm is calculated as the ratio of minimum cost to observed cost: CE= ωi xi* / ωi xi. The measure of cost efficiency lies between 0 and 1. A firm is completely cost efficient if the value of cost efficiency is 1. Then, 1-CE represents the amount by which the firm could reduce its costs and still produce at least the same amount of output.

3.2.3. The New Cost Efficiency or Tone Approach

Farrell measure of cost efficiency can be criticized at least on two counts. Firstly, it is assumed in the Farrell measure that all the firms face identical input prices which are quite unusual. If this is not the case, then the Farrell measure may not provide correct estimation of cost efficiency [1]. Secondly, in the financial sector, input and output quantities are expressed in monetary terms and consequently conceptualization as well as calculation of input and output prices are very difficult. To overcome these problems Tone (2002) advocated a different measure of cost efficiency which is based on a different production possibility set and is given as,

$P_c = \{(x_c,y) | x_c \geq X_c\lambda, y \leq Y\lambda, \lambda \geq 0, \Sigma\lambda = 1$……(4)

where x_c and X_c are given in monetary terms.

According to the Tone [1] approach the input vector xi expressed in physical terms is replaced by zi where zi is the vector of inputs expressed in monetary terms (i.e. zi = ωi xi). Under variable returns to scale, the new LP is, therefore:

Min $C = \Sigma z_i$ s.t. $z_i \geq Z\lambda$, $y_i \leq Y\lambda$, $\lambda \geq 0$, $\Sigma\lambda = 1$……(5)

Cost efficiency is calculated like before as the ratio of minimum cost and observed cost.

In order to use DEA for estimating cost efficiency, it is essential to identify the relevant inputs and outputs of Indian mutual funds industry. As per SEBI directive, since August 2009 there is no entry-load for purchasing mutual fund units and exit loads are also imposed under certain conditions. Hence there will be insufficient number of observations on sales load for doing any meaningful

analysis on cost efficiency. This is why the present study has used portfolio turnover ratio and expense ratio as two inputs and monthly return as output for estimation of cost efficiency.

Expense ratio is an indicator of the fund's efficiency and cost effectiveness. It is defined as the ratio of total expenses to average net assets of the fund. While portfolio turnover ratio is defined as the lesser of assets purchased or sold divided by the fund's net assets. High turnover ratio implies high transaction costs charged to the fund which in turn results in a low net return to the investors.

4. Empirical results

This study has used DEA based cost efficiency measure to evaluate the performance of Indian mutual funds schemes in respect of expense management.

However, as the cost related data are available for sixty-two schemes, data envelopment analysis is applied to this reduced sample. In this framework the study has used portfolio turnover ratio and expense ratio as two inputs and monthly return as output. Based on these inputs and output, cost efficiency score for each of the sixty-two schemes of the sample is calculated according to the new cost efficiency measure of Tone (2002). A score of one signifies a cost- efficient scheme and a score below one indicates a cost-inefficient scheme or a scheme that has not managed its operating costs efficiently.

Table 2: Expense management of various mutual fund schemes

Sl. No.	Scheme Name	DEA Score	Rank
1.	UTI Nifty Fund	1	1
2.	Reliance Vision	1	1
3.	Reliance growth	1	1
4.	PRINCIPAL Index Fund	1	1
5.	Taurus Bonanza Fund	0.996701	5
6.	Taurus Star share Fund	0.991578	6
7.	ICICI Prudential Tax plan	0.890072	7
8.	HDFC Equity	0.871895	8
9.	HDFC Top 200	0.852008	9
10.	HDFC Taxsaver	0.824104	10
11.	Templeton India Growth Fund	0.820388	11
12.	Franklin India Prima Fund	0.81713	12
13.	UTI MNC Fund	0.774951	13
14.	Franklin India Bluechip	0.770318	14

Sl. No.	Scheme Name	DEA Score	Rank
15.	Taurus Discovery Fund	0.755355	15
16.	Taurus Tax shield	0.752942	16
17.	HDFC Growth Fund	0.742978	17
18.	Birla Sun Life MNC Fund	0.741413	18
19.	ICICI Prudential Top 100 Fund	0.736726	19
20.	LIC Nomura MF Growth Fund	0.733241	20
21.	UTI Masterplus Unit Scheme 91	0.732391	21
22.	SBI Magnum Tax Gain Scheme 93	0.727045	22
23.	Sundaram Growth Fund	0.726163	23
24.	PRINCIPAL Growth Fund	0.715664	24
25.	Baroda Pioneer ELSS 96	0.714903	25
26.	Sundaram Taxsaver	0.711804	26
27.	UTI Energy Fund	0.711578	27
28.	Franklin India Prima Plus	0.708035	28
29.	L&T Opportunities Fund - Cumulative	0.700778	29
30.	LIC Nomura Equity Fund	0.698032	30
31.	Franklin Infotech Fund	0.69502	31
32.	Franklin India Opportunity Fund	0.689862	32
33.	Birla Sun Life Equity Fund	0.688362	33
35.	Tata Ethical Fund	0.684119	35
36.	Tata Tax Saving Fund	0.680228	36
37.	SBI Magnum Equity Fund	0.678171	37
38.	Birla Sun Life buy India Fund	0.67723	38
39.	Tata Life Sciences and Technology Fund - Appr	0.665313	39
40.	UTI Equity Fund	0.664294	40
41.	JM Basic Fund	0.659733	41
42.	LIC Nomura Tax Plan	0.658784	42
43.	UTI Services Industries Fund	0.649364	43
44.	ICICI Prudential FMCG	0.647607	44
45.	Franklin India Taxshield	0.643496	45
46.	DSP BlackRock Technology.com Fund - Reg	0.641713	46
47.	SBI Magnum Sector Funds Umbrella - Contra	0.640816	47
48.	ICICI Prudential Top 200 Fund	0.637909	48
49.	ING Core Equity Fund	0.636991	49
50.	Sahara Taxgain	0.634935	50
51.	SBI Magnum Multiplier Plus 93	0.632609	51
52.	Escorts Tax Plan	0.629907	52
53.	UTI Top 100 Fund	0.609728	53
54.	UTI Equity Tax Savings Plan	0.608487	54

Sl. No.	Scheme Name	DEA Score	Rank
55.	SBI Magnum Global Fund 94	0.607324	55
56.	JM Equity	0.59852	56
57.	Birla Sun Life New Millennium	0.592264	57
58.	ICICI Prudential Technology Fund	0.590426	58
59.	UTI Pharma and Healthcare Fund	0.585038	59
60.	Tata Pure Equity Fund	0.58	60
61.	SBI Magnum Sector Funds Umbrella Pharma	0.550905	61
62.	DSP BlackRock Opportunities Fund	0.275064	62

Source: Calculated by Author

Table 2 displays the number of efficient and inefficient schemes and their corresponding scores of DEA- cost efficiency. It is found that that there are four mutual funds schemes out of sixty-two which have a score of one which indicates that they are the most cost-efficient schemes. These schemes are RELIANCE VISION, RELIANCE GROWTH, UTI NIFTY and PRINCIPAL

INDEX FUND. Thus, these four schemes which are pure growth in nature are on the efficiency frontier and dominate all other schemes in terms of managing costs. On the contrary, the least efficient scheme is DSP BLACKROCK OPPORTUNITIES scheme. Thus, for the remaining fifty-eight schemes which lie below the efficiency frontier reduction in costs is required to make them efficient. The complement of the efficiency score, to wit, (1- efficiency score) indicates the amount of cost reduction required for a scheme to be efficient. This reduction varies from 0.33% to 72.49%.

3. Conclusion

Expense management or cost efficiency although a widely discussed issue in mutual funds industry in developed capital markets it was not properly addressed for Indian mutual funds industry so far. If the operating costs are not managed efficiently a large part of the return will be used up in the management operation and ultimately investors' net return will be less. Hence, expense management or efficiency in managing operating costs is a crucial factor in performance evaluation of mutual funds. This is why the present study attempted to measure the efficiency of the sample mutual funds schemes in terms of new cost efficiency model of Tone [1] using Data envelopment analysis (DEA). The results obtained according to this new cost efficiency measure indicates that there are four mutual funds schemes out of sixty-two schemes namely, RELIANCE VISION, RELIANCE GROWTH, UTI NIFTY and PRINCIPAL INDEX FUND have shown their efficiency in managing operating costs.

The findings suggest a need for greater focus on reducing operating costs to improve investor returns and enhance the overall efficiency of the mutual fund schemes. By addressing these inefficiencies, the Indian mutual funds industry can offer better value to investors and align more closely with global best practices.

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