A Study on Selected Equity Mutual Funds schemes using Data Envelopment Analysis Approach

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ABSTRACT - With the robust growth of Mutual fund industry in the past two decades, the analysis and research of the performance of mutual funds has become an important concern. The aim of Mutual Funds is to satisfy the investment objective of the investors and to safeguard their expectations. The performance of Mutual Fund is usually evaluated in relation with the Risk – Return Anatomy. Moreover, the fund Manger's performance is judged relation to its achievement of the targeted benchmark. Therefore, it becomes imperative to understand and evaluate the Mutual Fund performance on the grounds of its Management efficiency as well. Data Envelopment Analysis, a non parametric technique attempts to analyze efficiency score of each mutual fund, which will assist the investors in selecting the best fund not only on the basis of performance, but on the efficiency scores as well. For the purpose of the study the data of selected 12 equity growth mutual funds schemes are taken into consideration for 10 years to evaluate the efficiency of each DMU.

Key Words: Mutual Funds, Investment, Data Envelopment Analysis, Risk- Return, DMU

I. INTRODUCTION

Financial markets are becoming more encompassing with new financial instruments. New innovations are clearly noticeable in designing mutual fund portfolio's and its evaluation. Usually the performance of mutual funds is usually evaluated on the basis of risk- return parameters only, overlooking several other variables which may affect the overall performance of the funds. Data Envelopment Analysis is a non parametric approach applied in measuring the efficiency of funds, which allows employing varied inputs and outputs related to funds.

II. LITERATURE REVIEW

Hasan Qamar and Sanjay Singh (2017) used DEA approach- the non parametric method to analyze the efficiency of mutual funds. They studied 46 funds from 2006 to 2015. The study reveals that the best performing funds as per CRISIL also fail to pass the efficiency test.

D K Malhotra, Rashmi Malhotra, Vivek Bhargava (2016) studied 35 funds on an efficiency scale of 1 to 100. By considering a 12 month return, turnover ratio, SD, Expense Ratio, as inputs and outputs of DEA, it was found that only 11 growth funds were 100% efficient.

Shubhasis DasGupta and Mayank Patel (2015) in the paper "Performance evaluation of Indian Mutual Funds using Data Envelopment Analysis" suggested that DEA is a useful approach in understanding the performance pattern of mutual funds and other variables affecting it.

Leila Zamani, Resia Beegam and Samad Borzoian (2014) studied portfolio selection using DEA of selected Indian companies, wherein 3 different portfolios of stocks were analyzed, which provided a super efficiency coefficient ranging between 1.3909 to 2.0934.

Antonella Basso and Stefania Funari (2014) in her study concluded that DEA approach allows defining performance measures that are able to treat the multidimensional nature of the fund's performance, besides the traditional risk-return parameters.

Foroogh Ahmadizadeh (2014) studied the potential of peak moments of mutual funds in context of DEA. Assuming constant returns to scale, out of total 24 funds 9 only 9 funds were found 100% efficient during the study period.

Nikhat Afshan (2013) made an attempt to evaluate the relative performance of Mutual Funds under Balanced category using DEA approach from 2009 to 2012. The results showed that the overall performance of both types of has increased over a period of time, out of which some funds have remained 100% efficient right through the period of study.

 DOI : 10.18231/2454-9150.2019.0332

OBJECTIVES:

1. To Study and measure the inputs and outputs affecting equity mutual funds.
2. To evaluate and measure the efficiency of selected growth funds by using DEA approach.

III. METHODOLOGY

Data Envelopment Analysis evaluates the efficiency of an individual unit, corresponding to its inputs and outputs. It defines the efficiency measure of a production unit mathematically by a ratio of weighted sum of total outputs to weighted sum of total inputs. DEA is based on Linear Programming techniques without enforcing antagonistic presumption in the operational affiliation between the input and output variables, thus reflecting non parametric efficiency of each Decision Making Unit. The main objective behind using Data Envelopment Analysis in this context is its mathematical ability to handle multiple inputs and outputs.

IV. DATA ENVELOPMENT ANALYSIS

1. Inputs for DEA:

- Minimum Investment
- Standard Deviation
- Beta
- Expense Ratio
- Total Assets

2. Output for DEA:

- Annual Return
- Sharpe Ratio
- Alpha
- Turnover

LIMITATIONS:

1. It only focuses on selected equity growth mutual funds for the purpose of study.
2. The funds which are operative for the past 10 years are considered for the purpose of study.

Table showing Input Variables for selected Mutual Funds

Sr. No	Name of the Scheme	Expense Ratio	Mini Investment	SD	Total Assets (Cr)	Beta
1	Birla Sunlife Equity Fund	1.97	1000	14.33	10035	0.98
2	Baroda Hybrid Equity Fund	2.70	5000	11.33	686	0.89
3	DSP Equity Opportunity Fund	2.08	1000	15.56	5439	1.02
4	HDFC Equity Savings Fund	2.09	5000	5.61	6254	1.07
5	Sundaram Diversified Equity Fund	2.21	500	15.45	2539	1.07
6	IDFC Core Equity Fund	2.08	1000	14.79	2826	0.92
7	Invesco India Dynamic Equity Fund	2.21	5000	10.30	1036	0.85
8	Kotak Equity Opportunity Fund	2.09	5000	13.41	2332	0.88
9	SBI Focused Equity Fund	2.36	5000	14.01	3452	1.02
10	Mirae Asset India Equity Fund	2.05	5000	13.27	1458	0.95
11	Reliance Growth Fund	2.15	5000	15.71	6452	0.87
12	Tata Equity PE Fund	1.98	5000	15.05	5029	0.70

Table showing Output Variables for selected Mutual Funds

Sr. No	Name of the Scheme	Annual Return (%)	Turnover (%)	Sharpe Ratio	Alpha
1	Birla Sunlife Equity Fund	19.19	100	0.87	1.21
2	Baroda Hybrid Equity Fund	12.57	107	0.50	-1.98
3	DSP Equity Opportunity Fund	18.23	115	0.70	-0.62
4	HDFC Equity Savings Fund	10.42	35.89	1.02	2.19
5	Sundaram Diversified Equity Fund	15.71	63	0.61	-1.71
6	IDFC Core Equity Fund	14.19	41	0.45	-1.08
7	Invesco India Dynamic Equity Fund	16.04	300	0.64	-0.70
8	Kotak Equity Opportunity Fund	18.02	95.72	0.75	1.50

 DOI : 10.18231/2454-9150.2019.0332

9	SBI Focused Equity Fund	26.04	80	0.78	-1.05
10	Mirae Asset India Equity Fund	23.18	48	0.94	2.67
11	Reliance Growth Fund	18.14	157	0.62	-0.43
12	Tata Equity PE Fund	20.86	47.29	0.95	3.48

The above table indicates the input variables and output variables of the selected 12 equity growth mutual funds for the study.

Table Showing DEA analysis of Selected Mutual Fund Schemes

Name of the Scheme	Constant Returns to Scale	Variable return to Scale
Birla Sunlife Equity Fund	1	1
Baroda Hybrid Equity Fund	**0.893**	**0.815**
DSP Equity Opportunity Fund	1	1
HDFC Equity Savings Fund	1	1
Sundaram Diversified Equity Fund	**0.726**	**0.827**
IDFC Core Equity Fund	0.937	1
Invesco India Dynamic Equity Fund	1	1
Kotak Equity Opportunity Fund	1	1
SBI Focused Equity Fund	1	1
Mirae Asset India Equity Fund	1	1
Reliance Growth Fund	1	1
Tata Equity PE Fund	1	1

V. FINDINGS

The above table depicts the efficiency scores of selected equity mutual fund schemes by using Data Envelopment Analysis approach. The schemes having efficiency score of one are said to be performing efficiently, while the schemes having efficiency score of less than one are inefficient.

DEA uses two types of scales Constant Return to Scale and Variable Return to Scale. CRS assumes that an increase in input will result in the proportionate increase in output. In other words, there is a significant relationship between input resources and output. Incase of Mutual Fund scheme if the inputs will deviate than there will be a proportionate change or increase be observed. All the Mutual Funds except Baroda Hybrid Equity Fund, Sundaram Diversified Equity Fund, and IDFC Core Equity Fund have their efficiency scores less than 1.

On other hand Variable return to scale proposes that an increase in input resources will result in disproportionate increment in output. It means, either a growth or a decline in inputs or outputs does not result in proportionate change in inputs and outputs respectively. As per the above analysis it is been observed that Baroda Hybrid Equity Fund and Sundaram Diversified Equity Fund has the least efficiency score which is below 1. These funds are inefficient as compared with the other funds operating in the market considered for the study.

VI. CONCLUSION

With a variety of mutual funds floated in the market, it has become important for investors to use more efficient tools for selecting the best mutual funds. The Fund Managers are also very keen to know why and how they have performed better or worse in comparison to their peers in different facets of fund management. Therefore in this paper DEA approach- a non parametric method is been used to analyze the efficiency of mutual funds. As per analysis is been interpreted that Baroda Hybrid Equity Fund, Sundaram Diversified Equity Fund, and IDFC Core Equity Fund are inefficient when compared with other selected mutual funds. The study stresses that the evaluation of Mutual funds has to go over and above Risk return Measures. One has to understand that Mutual Fund performance is a multidimensional architecture, wherein overall fund management process should be given equal importance in selecting funds. The current study also highlights that in spite of having good returns the scheme has proven to be inefficient, because Mutual Fund Performance is also associated with expenses, size, and turnover also.

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