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PERFORMANCE EVALUATION OF EQUITY MUTUAL FUND SCHEMES: A COMPARATIVE STUDY OF AMCS IN INDIA

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Performance Evaluation of Equity Mutual Fund Schemes: A Comparative Study of AMCs in India

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Abstract – With a wide variety of investment alternatives available to a regular investor today, the risk adjusted evaluation of these alternatives assumes prime importance. One of the most common vehicle for collective investments is a Mutual Fund. With growing number of Asset Management Companies (AMCs) and their respective schemes and expanding Assets Under Management (AUM) in an emerging economy like India, an evaluation of returns generated by mutual funds on a risk adjusted basis continues to be of vital interest to investors who need to make informed decisions and to mutual fund managers whose compensation is tied to fund performance. This article does a performance evaluation of 20 equity mutual fund schemes spread uniformly across four top AMCs of India for a 10 year period. The study uses five prominent risk adjusted measures namely Sharpe's ratio, Jensen's Alpha, Treynor's Ratio, Information Ratio and M² ratio. These measures differ in how they define and measure risk and, consequently, in how they define risk-adjusted performance. The article also analyses differences in risk adjusted returns across AMCs for the selected performance evaluation measures. We find that ICICI Pru FMCG Reg (G) offers highest risk adjusted return as it features at the top position for four out of five measures. We conclude that HDFC Asset Management Company offers the best performing schemes two of its appear 4 times each in the top five positions for all performance measures put together. Finally, we also observe that average annual risk adjusted return offered by schemes of UTI Asset Management Company is the lowest as it offers the lowest risk adjusted returns according to M^2 ratio as compared to all other AMCs. For Treynor ratio also, UTI Asset Management Company has significantly lower risk adjusted returns than ICICI Prudential Asset Management Company.

Keywords: Performance evaluation of mutual funds, Sharpe's ratio, Jensen's Alpha, Treynor's Ratio, Information Ratio, M² ratio

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1. INTRODUCTION

The Indian mutual fund industry has evolved from a single player monopoly in 1964 to a fast growing, competitive market on the back of a strong regulatory framework. The Indian Capital Market witnessed unprecedented developments and innovations, particularly during the last two decades. These innovations relate to new financial institutions and new financial instruments such as mutual funds, and a variety of financial services like merchant banking, credit rating, factoring etc. Mutual fund is one type of investment vehicle which mobilizes savings of individuals and institutions and channelizes these savings into corporate securities to provide the investors a steady stream of returns and capital appreciation. Under the changed environment, mutual funds play a vital role in financial intermediation, development of capital markets and the growth of the corporate sector. In fact, mutual funds have now become an important medium of investment for an average Indian investor. By enabling the investors to indirectly participate in the Capital Markets and to reap the gains of adequate diversification and professional management, mutual fund is generally seen as an investment alternative which gives an opportunity to individual investors to invest in wider variety of assets which is difficult to do on a standalone basis. Mutual Funds help the investors by rendering low-cost services, such as gathering and processing information, identifying investment opportunities, formulating investment strategies, investing funds and monitoring progress.

In developed markets, mutual funds are a popular channel of investments among retail investors. Due to major participation of investors in the mutual fund market, the industry has evolved with time to offer

better and competitive services at low cost. The benefits that accrue to the investors in the form of lower fees and professional fund management make mutual funds all the more attractive and favourable instrument of investment. On the other hand, in an emerging market like India where efforts are on to connect every citizen to the banking system and raise financial literacy levels, retail participation in mutual funds is relatively low. Popular instruments of investments are bank deposits, insurance Funds, provident and pension Funds, gold, real estate etc. But on a positive side, India's mutual fund industry is on a growth spree. The growth in India's mutual fund industry has been one of the fastest in the world since 2004. This is due to rising income levels, growing investor base, rising financial awareness, industry expansion and efforts to educate and encourage investors to put savings in mutual funds schemes for achieving their desired investment objectives.

With a growing mutual fund industry like India's, it becomes important to evaluate the performance of mutual fund schemes on a risk adjusted basis and also assess the performance of schemes of the top grossing Asset Management Companies (AMCs). This is crucial to ensure that the mutual fund schemes are performing as per their objective and meeting investor requirements. Moreover a superior risk adjusted performance of mutual fund schemes is required to ensure that investors do not lose faith in this instrument of investment and are rather encouraged to invest more in mutual funds. This can serve as powerful boost for the expansion and penetration of the mutual fund industry to more and more households.

This study aims to evaluate performance of a total of 20 equity mutual fund schemes belonging to the four top mutual fund AMCs by AUM (Assets under Management) where five schemes have been selected to represent each AMC randomly.

2. LITERATURE REVIEW

The performance studies deal mainly with two aspects (1) evaluating stock selection skills and (2) examining the market timing abilities of the fund managers. Studies of stock selection date back to Jensen (1969) who finds that managers deliver negative abnormal returns. Using more recent data Ippolito (1989) finds evidence of positive abnormal returns. However, Elton et al (1992) show that the benchmark chosen by Ippolito causes this result. Using, multi-factor model, they find that abnormal fund returns are on average negative.

A series of empirical studies also deal with the market timing skills of mutual fund managers. Most of the previous work finds little evidence that fund managers possess market timing ability. Treynor and Mazuy (1966), hereafter referred to as TM develop test of market timing and find significant timing ability in only one out of 67 funds in their sample. Henriksson (1984)

uses the test of Henriksson and Merton (1981), hereafter referred to as HM, and finds that only 3 out of 116 funds exhibit significant positive timing ability. However, Bollen and Busse (2001) point out that statistical tests used in previous studies are weak as they are based on monthly data. Using daily data, they find evidence of market timing ability in a significant number of funds in their sample.

Ferson and Schadt (1996) state that standard measures of performance designated to detect security selectivity and market timing ability suffer from a number of biases. Most previous work employs traditional performance measures that use unconditional expected returns as a baseline. However, if expected returns and risks vary over time such an unconditional approach is not desirable. Common time variations in returns and risk premium will be confused with average performance.

Despite the use of high-frequency data as well as a more comprehensive benchmark, the performance results, especially those of market timing, may still suffer from Jagannathan and Korajczyk (1986) bias provided the fund returns are more option like compared to the market returns.

In the Indian context, Bara and Verma (1991) made one of the early works in the area. They evaluated the performance of 'Mastershare', the first close ended mutual fund in India during 1987-1991 and concluded with satisfactory performance of the fund using Jensen and other measures. Shah and Thomas (1994) made the performance evaluation of 11 mutual fund schemes and reported inferior returns by all the schemes excepting one. Jaydev (1996) has examined the performance of 2 schemes, viz. 'Mastergrain', 1991 of UTI and 'Magnum Express' of SBI Mutual Funds. He found unsatisfactory diversification as well as insignificant selectivity and timing skills of the schemes.

Gupta (2000) has evaluated performance of 73 mutual funds using weekly NAV data form 1994 to 1999 and arrived at mix bag of performance for the schemes. Gupta and Gupta (2004) found no conclusive evidence in support of superior stock selection performance of Indian Mutual funds. Tripathy (2004) examined the performance of 31 tax planning schemes in India over the period of 1994-95 to 2001-02 and reported no selectivity of the funds in general. Anand and Murugaiah (2006) also found lack of superior stock selectivity among the fund managers of 113 selected schemes during April 1999 to March 2003.

However, significant positive stock selection abilities have been reported in Chander (2005) across various measurement criteria considering a sample of 80 schemes during 1998-2002. Sehgal and Jhanwar (2008) also found improved evidence of selectivity using higher frequency data such as daily

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returns vis-à-vis monthly returns of 59 mutual funds schemes during 2000-04.

3. CONCEPTUAL FRAMEWORK

A Mutual Fund is a trust that pools the savings of a number of investors who share a common financial goal. The money thus collected is invested in capital market instruments such as shares, debentures and other securities. The income earned through these investments and the capital appreciation realized is shared by its unit holders in proportion to the number of units owned by them. The value of each unit in a mutual fund scheme is reflected in Net Asset Value (NAV) which is usually available on a daily basis for traded funds. This NAV is calculated by dividing the Total Net Assets (minus all liabilities) by the number of outstanding units in a mutual fund scheme. The growth in NAV is a reflection of the performance of a mutual fund scheme. Thus, a Mutual Fund is the most suitable investment for the common person as it offers an opportunity to invest in a diversified, professionally managed basket of securities at a relatively low cost. The flow chart below describes broadly the working of a mutual fund:

Mutual Fund Process
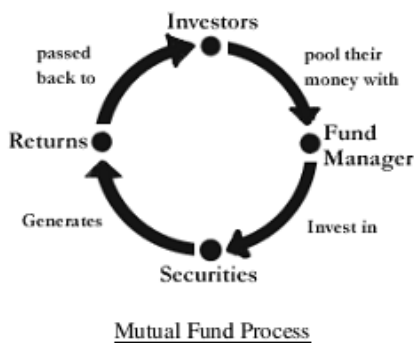
Mutual funds as an investment alternative have pros and cons. Some of the key advantages of investing in mutual funds include portfolio diversification, Professional Management, Liquidity, Convenience and Flexibility, Reduction in Transaction Costs as compared to standalone stock investing, tax benefits, regulation and transparency. On the other hand, some disadvantages of investing in mutual funds is no customisation of portfolio, no control over stock selection, management costs, fund manager bias etc.

4. OBJECTIVE OF THE STUDY

The considerations underlying the performance evaluation of mutual funds is a matter of concern to the fund managers, investors and researchers alike. The present paper attempts to answer two questions relating to mutual fund performance:

I. **How do the selected schemes perform on the basis of different risk adjusted performance criteria?** Our objective is to rank the schemes on the basis of all risk adjusted based measures used in the study and to identify the top three performing schemes for every risk adjusted measure.

II. **Is there a significant difference among the Asset Management Companies (AMCs) with respect to the risk adjusted performance of schemes offered by them?** Our objective is to find out whether the average risk adjusted return of schemes varies across AMCs or not. This difference in performance of schemes across AMCs is studied separately for all risk adjusted performance measures. Finally, we aim to find out the top performing AMC for every risk adjusted measure if there exist a difference.

5. DATA

The analysis conducted in this paper relates to 20 equity mutual fund schemes. These are growth oriented schemes which have an investment objective for long term capital appreciation i.e. they fall in the high risk-high return bracket of risk aversion. For uniform and consistent analysis for the second objective in which we analyse performance of different mutual fund schemes across AMCs, five schemes each have been selected randomly (for which the data is available for the 10 year study period i.e. 1st January 2003 to 31st December 2013) belonging to four top AMCs in India by Assets Under Management (AUM). These AMC are Birla Sun Life Asset Management Company Ltd., ICICI Prudential Asset Management Company Ltd., HDFC Asset Management Company Ltd. and UTI Asset Management Company Ltd. These are four of the five biggest AMCs by AUM in India. The one of the five biggest AMCs that could not be included in the analysis is Reliance Mutual Fund due to lack of adequate number of schemes for the period selected for the study.

The daily closing NAV (Net Asset Value) data for all the 20 schemes has been taken from an independent website called www.mywealthclub.com for the 10 year period starting 1st January 2003 to 31st December 2013. For the market benchmark i.e. CNX Nifty 50, daily data for index closing figure has been taken from the Bloomberg database for the same 10 year period.

For the risk free rate, 91 day Treasury Bill annualized rates have been used. This data has been collected from the RBI website.

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6. METHODOLOGY

The data requisites for the scrutiny of selected mutual fund schemes are their closing net asset value for all schemes, Nifty closing values, 91 day Treasury Bill annualized yield. Out of this data, we calculate average annual returns and average annual standard deviation for the schemes and Nifty 50, Annual beta values, average annual fund excess return over 91 day treasury bill's annual yield, average annual fund excess return over average annual returns of Nifty 50, annual standard deviation of excess fund returns over Nifty 50. These calculations are then used to compute Sharpe's ratio, Jensen's Alpha, Treynor's Ratio, Information Ratio, M² ratio for each scheme selected for the study. Relevant concepts in this regard are explained below.

a)   **Return:** For each mutual fund scheme under study, the monthly returns are computed as:

r_i = ln(ending NAV/Beginning NAV)

The market returns are computed on similar lines with National Stock Exchange's 50 share index called Nifty 50 as benchmark. The return on the market portfolio is computed as:

r_i = ln(ending Nifty/Beginning Nifty)

b)   **Risk:** Standard deviation of returns is used as a measure of total portfolio risk. The annual standard deviation is computed daily logarithmic returns for each scheme.

c)   **Beta:** It is used a measure of systematic risk. To obtain the measure of systematic risk (Beta) of the mutual fund scheme, Market Model is applied. The beta value is calculated by using the following formula:

$$\beta_A = \frac{Cov(R_A R_m)}{\sigma^2_{R_m}}$$

Beta coefficient is calculated as covariance of a stock's return with market returns divided by variance of market return. This measures systematic risk which is the risk inherent in the whole financial system. Beta can be understood as a measure of the volatility, or systematic risk, of a security or a portfolio in comparison to the market as a whole. A beta of 1 indicates that the investment will move with the market. A beta of less than one means that the investment will be less volatile than the market. A stock with a beta of 1.5 implies that if market return changes by 1%, the stock return changes by 1.5%.

d)   **Risk-Free asset:** By definition, a risk less asset has zero variability of returns. If an investor buys an asset at the beginning of the holding period with the known terminal value, such type of asset can be called as risk-less or risk free asset. We have taken RBI's 91-day treasury bill's annual yield as proxy for risk-free asset.

e)   **Treynor's Ratio:** This ratio is evaluated the performance of fund against a the return offered by a broad market benchmark. This measure assumes that investor can eliminate unsystematic risk by holding a diversified portfolio. Hence this performance measure denoted as T_p is the excess return over the risk free rate per unit of systematic risk, in other words it indicates risk premium per unit of systematic risk.

$$T_P = \frac{Risk\ Premium}{Systematic\ Risk\ Index} = \frac{r_p - r_f}{\beta_P}$$

where

T_P= Treynor's Ratio,

r_P= portfolio return,

r_f= risk free return,

β_P= Beta coefficient for portfolio.

As the market beta is 1, Treynor's index TP for benchmark portfolio is (r_m-r_f) where r_m= market return. If TP of the mutual fund scheme is greater than (r_m-r_f), then the scheme has outperformed the market.

f)   **Sharpe's Ratio:** William F. Sharpe (1966) devised an index of portfolio performance measure, referred to as reward to variability ratio denoted by S_p. He assumes that a small investor invests fully in the mutual fund and does not hold any portfolio to eliminate unsystematic risk and hence demands a premium for the total risk.

$$S_P = \frac{Risk\ Premium}{Total Risk} = \frac{r_p - r_f}{\sigma_P}$$

where,

S_P= Sharpe's Ratio,

r_P= portfolio return,

r_f= risk free return,

σ_P= standard deviation of portfolio returns.

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The S_P for benchmark portfolio= $(r_m - r_f)/\sigma_m$

If Sharpe ratio of the mutual fund scheme is greater than that of the market portfolio, the fund has outperformed the market. The superiority of the Sharpe ratio over the Treynor ratio is, it considers the point whether investors are reasonably rewarded for the total risk in comparison to the market. A mutual fund scheme with a relatively large unique risk may outperform the market in Treynor's index and may underperform the market in Sharpe ratio. A mutual fund scheme with large Treynor ratio and low Sharpe ratio can be concluded to have relatively larger unique risk. Thus the two indices rank the schemes differently. The major limitation of the Sharpe ratio is that it is based on the Capital Market Line (CML). The major character of the capital market line is only the efficient portfolios can be plotted on the CML but not inefficient. Hence, we assume that a managed portfolio (mutual fund scheme) is an efficient portfolio.

g) **Jensen's Alpha:** Michael C.Jensen (1968) gave a new perspective to performance evaluation by comparing the fund return to the return required by an eminent asset pricing model. This ratio measures the performance as the excess return provided by the portfolio over the expected CAPM returns. This ratio assumes that the investor should atleast get returns as expected by CAPM.

$$J_P = Portfolio.Return - CAPM.Return = r_P - \left\{ r_f + \beta_P \left(r_m - r_f \right) \right\}$$

where,

J_P= Jenson's measure for portfolio

r_P= portfolio return

r_f= risk free return

β_P= beta coefficient of the portfolio.

A positive value of J_P would indicate that the scheme has provided a higher return over the CAPM return and lies above Security Market Line (SML) and a negative value would indicate it has provided a lower than expected returns and lies below SML. The Jensen model assumes that the portfolio is fully invested and is subjected to the limitations of CAPM.

h) **M² Measure:** In 1997, Nobel-prize winner Franco Modigliani and his granddaughter, Leah Modigliani, developed the Modigliani Risk-Adjusted Performance measure. They originally called it "RAP" (Risk Adjusted Performance). For a portfolio, this measure tries to find the return that would have been earned by the portfolio if it had the same level of risk as the market benchmark. Following is the formula of the M^2 ratio:

M^2 Ratio = (Portfolio's average excess return over risk free rate/standard deviation of portfolio excess return over risk free rate)*standard deviation of benchmark excess return over risk free rate

Hence we can see that the per unit excess return of portfolio is calculated first and then multiplied the risk of benchmark excess return in order to find out the corresponding return level of the portfolio if it had the same level of risk as market benchmark.

i) **Information Ratio:** The Information ratio is a measure of the risk-adjusted return of a financial security (or asset or portfolio) vis-a-vis a relavant benchmark return. It is also known as Appraisal ratio and is defined as expected active return divided by tracking error, where active return is the difference between the return of the security and the return of a selected benchmark index, and tracking error is the standard deviation of the active return; i.e., the information ratio IR is:

$$IR = \frac{E[R_p - R_b]}{\sigma} = \frac{\alpha}{\omega} = \frac{E[R_p - R_b]}{\sqrt{\mathrm{var}[R_p - R_b]}},$$

where R_p is the portfolio return, Rb is the benchmark return, α= E[Rp – Rb] is the expected value of the active return, and $\omega = \sigma$ is the standard deviation of the active return, which is an alternate definition of the aforementioned tracking error.

The information ratio is often used to gauge the skill of managers of mutual funds, hedge funds, etc. In this case, it measures the active return of the manager's portfolio divided by the amount of risk that the manager takes relative to the benchmark.

Higher the information ratio, higher the active return of the portfolio given the amount of risk taken, and the better the manager.

We simply calculate the above mentioned performance evaluation measures for each scheme and tabulate them in order to rank all the selected 20 schemes on the basis of each risk adjusted performance measure separately. Then we identify if there are any schemes which appear in the top five positions i.e. first quartile for most of the performance ratios. This serves our objective I.

For the second objective we run ANOVA analysis for all of the five performance ratios to find if there are any significant differences among the mean values of these ratios across AMCs. If there exists such a

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difference, we identify the relevant AMCs which have different mean values for the performance measures.

7. ANALYSIS AND INTERPRETATION

The first step is to have a descriptive analysis of all the twenty schemes under study and identify the schemes offering the highest return for the selected 10 year period.
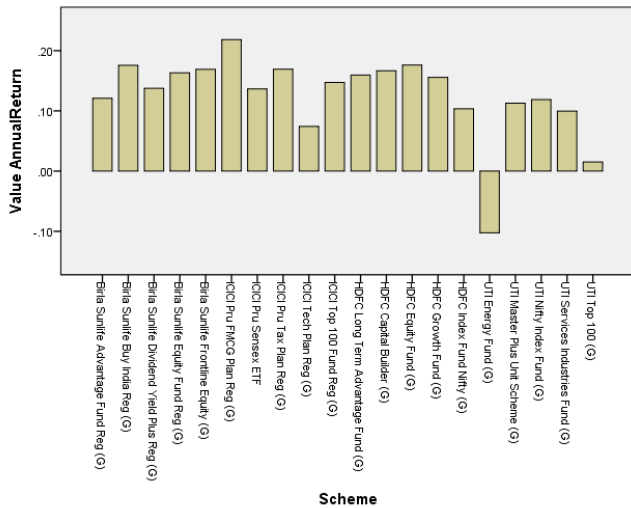
From the above graph we can conclude that average annual absolute return (without taking risk into consideration) of ICICI Pru FMCG Plan Reg (G) is the highest i.e. 21.83% and UTI Energy Fund (G) has the lowest average annual return i.e. -10.24%.

Now we introduce risk into the picture and rank all the schemes on the basis of risk adjusted measures. The following two tables represent these rankings.

Ranking	Sharpe Ratio	Treynor Ratio	Jensen's Alpha
1	ICICI Pru FMCG Plan Reg (G)	ICICI Pru FMCG Plan Reg (G)	ICICI Pru FMCG Plan Reg (G)
2	Birla Sunlife Buy India Reg (G)	Birla Sunlife Buy India Reg (G)	Birla Sunlife Buy India Reg (G)
3	HDFC Capital Builder (G)	HDFC Capital Builder (G)	ICICI Pru Tax Plan Reg (G)
4	HDFC Equity Fund (G)	ICICI Pru Tax Plan Reg (G)	HDFC Capital Builder (G)
5	HDFC Long Term Advantage Fund (G)	HDFC Long Term Advantage Fund (G)	HDFC Long Term Advantage Fund (G)
6	ICICI Pru Tax Plan Reg (G)	HDFC Equity Fund (G)	HDFC Equity Fund (G)
7	Birla Sunlife Frontline Equity (G)	Birla Sunlife Frontline Equity (G)	Birla Sunlife Frontline Equity (G)
8	HDFC Growth Fund (G)	Birla Sunlife Equity Fund Reg (G)	Birla Sunlife Equity Fund Reg (G)
9	Birla Sunlife Equity Fund Reg (G)	HDFC Growth Fund (G)	HDFC Growth Fund (G)
10	Birla Sunlife Dividend Yield Plus Reg (G)	Birla Sunlife Dividend Yield Plus Reg (G)	ICICI Top 100 Fund Reg (G)
11	ICICI Top 100 Fund Reg (G)	ICICI Top 100 Fund Reg (G)	Birla Sunlife Dividend Yield Plus Reg (G)
12	ICICI Pru Sensex ETF	ICICI Pru Sensex ETF	ICICI Pru Sensex ETF
13	Birla Sunlife Advantage Fund Reg (G)	Birla Sunlife Advantage Fund Reg (G)	Birla Sunlife Advantage Fund Reg (G)
14	UTI Nifty Index Fund (G)	UTI Nifty Index Fund (G)	UTI Nifty Index Fund (G)
15	UTI Master Plus Unit Scheme (G)	UTI Master Plus Unit Scheme (G)	UTI Services Industries Fund (G)
16	HDFC Index Fund Nifty (G)	HDFC Index Fund Nifty (G)	UTI Master Plus Unit Scheme (G)
17	UTI Services Industries Fund (G)	UTI Services Industries Fund (G)	ICICI Tech Plan Reg (G)
18	ICICI Tech Plan Reg (G)	ICICI Tech Plan Reg (G)	HDFC Index Fund Nifty (G)
19	UTI Top 100 (G)	UTI Top 100 (G)	UTI Top 100 (G)
20	UTI Energy Fund (G)	UTI Energy Fund (G)	UTI Energy Fund (G)

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Ranking	M² ratio	Information Ratio
1	ICICI Pru FMCG Plan Reg (G)	Birla Sunlife Frontline Equity (G)
2	Birla Sunlife Buy India Reg (G)	HDFC Equity Fund (G)
3	HDFC Capital Builder (G)	ICICI Pru FMCG Plan Reg (G)
4	HDFC Equity Fund (G)	Birla Sunlife Equity Fund Reg (G)
5	HDFC Long Term Advantage Fund (G)	ICICI Top 100 Fund Reg (G)
6	ICICI Pru Tax Plan Reg (G)	ICICI Pru Sensex ETF
7	Birla Sunlife Frontline Equity (G)	HDFC Capital Builder (G)
8	Birla Sunlife Equity Fund Reg (G)	HDFC Growth Fund (G)
9	HDFC Growth Fund (G)	Birla Sunlife Buy India Reg (G)
10	Birla Sunlife Dividend Yield Plus Reg (G)	ICICI Pru Tax Plan Reg (G)
11	ICICI Top 100 Fund Reg (G)	HDFC Long Term Advantage Fund (G)
12	ICICI Pru Sensex ETF	Birla Sunlife Dividend Yield Plus Reg (G)
13	Birla Sunlife Advantage Fund Reg (G)	Birla Sunlife Advantage Fund Reg (G)
14	UTI Nifty Index Fund (G)	UTI Nifty Index Fund (G)
15	UTI Master Plus Unit Scheme (G)	UTI Master Plus Unit Scheme (G)
16	HDFC Index Fund Nifty (G)	UTI Services Industries Fund (G)
17	UTI Services Industries Fund (G)	UTI Top 100 (G)
18	ICICI Tech Plan Reg (G)	ICICI Tech Plan Reg (G)
19	UTI Top 100 (G)	UTI Energy Fund (G)
20	UTI Energy Fund (G)	HDFC Index Fund Nifty (G)

As we can observe that ICICI Pru FMCG Reg (G) fares relatively better in all the performance measures by featuring at the top position for four out of five measures. Next in line is Birla Sunlife Buy India Reg (G) which appears in the second position for four out of the five measures. Other top schemes are HDFC Capital Builder (G) and HDFC Long Term Advantage Fund (G) which appear 4 times each in the top five positions for all performance measures put together.

To serve our second objective of finding difference in the mean value of performance measures across AMCs, we resort to ANOVA i.e. Analysis of Variance. But first we tabulate the mean values of performance measures across AMCs. The following table shows the same.

		N	Mean	Std. Deviation	Std. Error
Treynor Ratio	Birla Sun Life Asset Management Company Ltd.	5	.11234	.035986	.016093
	ICICI Prudential Asset Management Company	5	.12693	.105032	.046972
	HDFC Asset Management Company Ltd.	5	.11052	.041156	.018405
	UTI Asset Management Company Ltd.	5	-.02423	.110765	.049536
	Total	20	.08139	.097423	.021784
M2 Ratio	Birla Sun Life Asset Management Company Ltd.	5	.1020	.03004	.01343
	ICICI Prudential Asset Management Company	5	.1043	.07231	.03234
	HDFC Asset Management Company Ltd.	5	.1028	.03647	.01631
	UTI Asset Management Company Ltd.	5	.0003	.07029	.03144
	Total	20	.0774	.06852	.01532
Sharpe Ratio	Birla Sun Life Asset Management Company Ltd.	5	.38868	.114053	.051006
	ICICI Prudential Asset Management Company	5	.39811	.276189	.123515
	HDFC Asset Management Company Ltd.	5	.39240	.139266	.062281
	UTI Asset Management Company Ltd.	5	.25259	.342749	.153282
	Total	20	.35794	.226978	.050754
Jensens Alpha	Birla Sun Life Asset Management Company Ltd.	5	.0426	.02584	.01156
	ICICI Prudential Asset Management Company	5	.0506	.05354	.02394
	HDFC Asset Management Company Ltd.	5	.0429	.03266	.01461
	UTI Asset Management Company Ltd.	5	-.0633	.09091	.04066
	Total	20	.0182	.07107	.01589
Information Ratio	Birla Sun Life Asset Management Company Ltd.	5	.3552	.27783	.12425
	ICICI Prudential Asset Management Company	5	.3258	.31103	.13910
	HDFC Asset Management Company Ltd.	5	.2041	.57299	.25625
	UTI Asset Management Company Ltd.	5	-.2331	.25776	.11527
	Total	20	.1630	.42207	.09438

Observing the values in the above table , we can see that there is considerable amount of variation for the mean values of the Treynor ratio and M^2 ratio across AMCs. To find out if this variation in the mean values of Treynor ratio and M^2 ratio is statistically significant, we now conduct ANOVA analysis.

All the three assumptions of ANOVA i.e. independent among samples, normality of the scale variable and homogeneity of variances are met for four performance ratios i.e. Sharpe Ratio, Treynor Ratio, Information Ratio and M^2 Ratio. But for Jensen's Alpha the assumption of normality is not satisfied.

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Hence for Jensen's Alpha we resort to the non-parametric substitute of ANOVA i.e. Kruskal Wallis Test. Following is the table summarizing the ANOVA results for all the performance measures.

S. No.	Statement of Hypothesis	Result (α=0.05)	p value
1.	H_0: Mean value of Sharpe Ratio does not vary across Asset Management Companies	Not rejected	0.729
2.	H_0: Mean value of Treynor Ratio does not vary across Asset Management Companies	Rejected	0.031
3.	H_0: Mean value of Jensen's Alpha does not vary across Asset Management Companies (Kruskal-Wallis Test)	Not rejected	0.056
4.	H_0: Mean value of M^2 Ratio does not vary across Asset Management Companies	Rejected	0.022
5.	H_0: Mean value of Information Ratio does not vary across Asset Management Companies	Not rejected	0.088

We can observe that there exists a significant difference among the mean values of Treynor Ratio and M^2 Ratio across different AMCs.

We now conduct Post Hoc analysis for finding which AMCs have significantly different values of Treynor Ratio and M^2 Ratio.

Post Hoc analysis shows that mean values of Treynor ratio are statistically significantly different for UTI Asset Management Company and ICICI Prudential Asset Management Company (p value being .042).

Post Hoc analysis for M^2 ratio shows that mean values of M^2 ratio are statistically significantly different for UTI Asset Management Company and ICICI Prudential Asset Management Company (p value being .042); UTI Asset Management Company and Birla Sunlife Asset Management Company (p value being .047); for UTI Asset Management Company and HDFC Asset Management Company (p value being .045).

Hence UTI Asset Management Company offers the lowest risk adjusted returns according to M^2 ratio as compared to all other AMCs. For Treynor ratio also, UTI Asset Management Company has significantly lower risk adjusted returns than ICICI Prudential Asset Management Company.

8. CONCLUSION

This study undertakes the task of performance valuation of five schemes each off top four AMCs of India for an extensive 10 year period to filter out any impact of varying economic conditions and effect of business operating cycles. Although this long period lead to survivorship bias which is one of the limitations of this study as only those schemes are analysed which were active and traded for this 10 year long period. This study not only evaluated the performance of schemes on a risk adjusted basis but also finds the best performing AMCs on the basis of the performance of their schemes. We find that ICICI Pru FMCG Reg (G) offers highest risk adjusted return as it features at the top position for four out of five measures. We conclude that HDFC Asset Management Company offers the best performing schemes two of its appear 4 times each in the top five positions for all performance measures put together. Finally, we also observe that average annual risk adjusted return offered by schemes of UTI Asset Management Company is the lowest as it offers the lowest risk adjusted returns according to M^2 ratio as compared to all other AMCs. For Treynor ratio also, UTI Asset Management Company has significantly lower risk adjusted returns than ICICI Prudential Asset Management Company.

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