Performance Evaluation of Select Mutual Funds : A Public - Private Comparison

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Abstract

The present study attempted to evaluate the investment performance of select public and private sector mutual fund schemes against risk-free rate and benchmark/market index for a period of 7 financial years, that is, from 2010 to 2017 (84 months). The sample included a total of 8 equity/growth schemes, 4 from public sector and 4 from private sector. For the analysis, monthly NAV of sample schemes were taken, and monthly closing values of BSE 100 were considered as the benchmark index, 91-days treasury bills were taken as the risk-free rate. Risk return analysis along with analysis of risk - adjusted performance measures such as Sharpe ratio, Treynor ratio, Jensen measure, and Sharpe - differential measure were used for evaluating the investment performance of the selected sample schemes. The findings of the study revealed that private sector funds outperformed the public sector funds against their benchmark index in terms of risk - return analysis as well as risk - adjusted measures of performance evaluation throughout the study period, and it was also observed that among the schemes, small & mid cap category of schemes of both the sectors were the top performers.

Keywords : performance, mutual funds, risk - return, risk - adjusted return

JEL Classification : G11, G20, G23

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Mutual funds are defined as an organization which takes money from small investors and invests it in stocks and shares for them, the investment being in the form of shares in the fund (Dictionary of Banking and Finance, 2005). Mutual funds serve as an efficient tool for investment as they mobilize savings of investors into productive channels under the guidance of professional expertise. Mutual funds have gained immense importance in recent years, particularly because they are an effective, low - cost way for investors to participate in financial markets by spreading risks through portfolio diversification. They are crucial for the financial sector, in particular, and also play an important role in overall development of the capital market in India.

The Indian mutual fund industry is one of the major results of financial novelty (Yadav, 2015). It commenced with the setting up of the Unit Trust of India (UTI) by the Government of India in 1964. The UTI functioned as a monopolist until 1986. It was in 1987 that public sector mutual funds (banks and financial institutions) were allowed to enter the market. SEBI (Mutual Fund) Regulations, 1993 formulated comprehensive guidelines and regulatory framework for mutual funds and in 1993, private sector and foreign (joint - venture) mutual fund companies were allowed to launch mutual funds in the Indian mutual funds industry. This bold step of liberalization and opening up of the industry to private and foreign players led to a new era in the growth and development of the Indian mutual funds industry (AMFI, n.d. a.). With this, the level of competition increased and the industry witnessed improvement in efficiency. There was an increase in the number of mutual fund companies,

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number and variety of schemes offered to investors, resource mobilization, as well as asset under management (AUM) in the post liberalization period.

The process of liberalization led to the entry of the private sector in the industry. There was an increase in competition between both - public and private sector. Hence, it becomes important to evaluate their investment performance so that investors may be able to decide which sector to invest in that would provide fruitful returns and also to help fund managers improve the performance of the underperforming funds.

Literature Survey

The academic literature on performance evaluation of mutual funds is vast. Some of them have been reviewed. Sapar and Madava (2009) evaluated the performance of Indian mutual funds industry in a bear market by using risk-return analysis, Sharpe ratio, Treynor ratio, and Jensen and Fama measures. Monthly closing NAV data was taken from AMFI from September 1998 to April 2002. A total of 58 open-ended schemes were taken as a sample for the analysis. The findings of the study revealed that most of the sample schemes were able to generate higher returns over expected returns in terms of total as well as systematic risk. Devi and Kumar (2010) evaluated investment performance of equity mutual funds in India during 2003 - 2007 by using average rate of return, standard deviation, and risk - return analysis. Furthermore, risk adjusted measures of performance evaluation such as Sharpe ratio, Treynor ratio, and Jensen measure were also used. A total of 102 schemes were taken as sample schemes - 56 equity diversified funds, 21 equity index funds, 18 equity tax saving funds, and seven equity technology funds. The study made a comparative analysis of investment performance of public and private sector mutual funds, and the findings revealed that there was no significant difference between the performance of public and private sector mutual funds in India.

Dhanda, Batra, and Anjum (2012) evaluated investment performance of select open - ended mutual fund schemes in terms of risk-return as well as risk-adjusted returns by using rate of return, beta, standard deviation, Treynor and Sharpe ratios from April 2009 to March 2011. The findings revealed that only three schemes, namely HDFC Top 200, HDFC Capital Builder Fund, and UTI Opportunities Fund had outperformed the market. Zaheeruddin, Sivakumar, and Reddy (2013) analyzed the performance of three private sector mutual funds from July 1, 2009 to April 2, 2012. Besides risk-return analysis, risk-adjusted measures of performance evaluation such as Sharpe and Treynor ratios and Jensen Alpha were also used to assess the performance. The results of the study revealed that ICICI generated highest returns ; whereas, Birla Sun Life was the riskiest one. Pal and Chandani (2014) attempted to study the performance of top 10 equity mutual fund schemes for a period of 5 years, that is, from 2007 to 2012. With the help of statistical measures such as standard deviation, R-square, beta, expense ratio, and Sharpe ratio, the study revealed that among all the sample schemes, HDFC Mid Cap Opportunities and Quantum Long Term Equity emerged as top performers during the period of the study.

Goyal (2015) evaluated the performance of top 10 mutual funds and also compared their performance with benchmark index, that is, CNX Nifty and S&P. By using Sharpe ratio, Treynor ratio, and Jensen measure, the study found that overall, all the schemes performed well as they generated higher and better returns as compared to the market index. Among all the sample schemes, Franklin India Opportunities Fund was found to be the best performer as it generated higher average returns, and at the same time, possessed lower risk as well. Tomer and Khan (2015) analyzed the performance of mutual funds in India by using risk return measures, Sharpe ratio, Treynor ratio, Jensen - differential measure, and Sharpe - differential measure from January 1, 2005 to December 30, 2010. The results showed mixed performance of sample schemes. Moreover, the private sector funds performed better than the public sector funds in all aspects.

Gowri and Deo (2016) evaluated the performance of funds of funds by using risk-adjusted methods of

performance evaluation and compared their performance with that of risk-free rate (91 days Treasury Bills) and the market index (BSE 100). The study analyzed the performance of funds of funds for 7 financial years, that is, from April 2007 to March 2014 by using risk-adjusted measures of performance such as Sharpe ratio, Treynor ratio, and Jensen alpha. The results of the study showed that the sample schemes generated negative returns in excess of the risk - free rate. Furthermore, most of the sample funds underperformed the market index. Mishra and Ahuja (2016) attempted to analyze the performance of Indian mutual funds in two separate periods, that is, bull and bear periods. The time period from January 8, 2008 to March 9, 2009 was taken as the bear period ; whereas, the time period from March 9, 2009 to June 30, 2014 was considered as the bull period. Sharpe ratio, Treynor ratio, information ratio, Sortino ratio, and M square were the risk-adjusted measures of performance ; whereas, to study the market-timing and stock selection skills of the fund managers, Jensen measure, Fama net selectivity, Treynor - Mazuy and Henriksson-Merton models were used. The results of the risk-adjusted measures of performance revealed that the funds performed differently under the two market conditions, but performed poorly, particularly in the down market condition (bear period). Overall, the funds had underperformed the market index during the study period. Moreover, most of the funds showed that the fund managers possessed stock selectivity skills but failed to be efficient market-timers during the entire study period.

Rathore and Singh (2017) conducted yet another study to evaluate the sector-wise (public, private, and foreign) performance of mutual funds in India for a period of 11 financial years, that is, from 2003 to 2014. The study was divided into three sub-periods depending upon the movements of SENSEX, namely pre - period, inter - period, and post - period. By using Sharpe ratio, Treynor ratio, and Jensen measure, the study analyzed the sample schemes and observed that the private sector outperformed the public and foreign sectors in pre as well as post periods and equity schemes performed better as compared to balanced and tax saving schemes.

Objectives of the Study

(1) To make a comparative risk- return analysis of public and private sector schemes against market risk and return.

(2) To make a comparative performance evaluation of public and private sector schemes using risk - adjusted portfolio evaluation techniques.

(3) To determine the stock selection ability of public and private sector fund managers.

Testable Hypotheses

On the basis of above mentioned objectives, the following hypotheses were tested :

✤ **H01 :** The private sector schemes failed to outperform public sector schemes as against benchmark/market index returns (in terms of risk and return).

✤ **Ha1 :** The private sector schemes outperformed public sector schemes as against benchmark/market index returns (in terms of risk and return).

✤ **H02 :** The private sector schemes do not exhibit superior performance than public sector as compared to benchmark/market index (in terms of risk - adjusted performance measures).

✤ **Ha2 :** The private sector schemes exhibit superior performance than public sector as compared to benchmark/market index (in terms of risk - adjusted performance measures).

✤ **H03:** The private sector fund managers do not possess better stock selection skills as compared to public sector fund managers.

✤ **Ha3:** The private sector fund managers possess better stock selection skills as compared to public sector fund managers.

Database and Methodology

(1) Database Description and Profile of Sample Schemes : The study is empirical in nature. A period of 84 months from April 2010 to March 2017 has been considered for the study. The sample includes a total of eight equity oriented growth schemes in which four schemes belonged to public sector and four to private sector. Large cap and small & mid - cap category of schemes were selected. Secondary sources of data were considered for the purpose of data collection. For the purpose of analysis, monthly NAV data of selected schemes were taken from respective official websites of the mutual fund houses, monthly closing values of BSE 100, which is used as the benchmark index, were taken from the official website of Bombay Stock Exchange, and monthly yield on 91-days treasury bills was taken as the risk - free rate.

The Table 1 provides a brief detail about the selected sample schemes of the public and private sector, and certain codes have been assigned to them.

Table 1. Profile of Selected Public and Private Sector Schemes

Public Sector			Private Sector		
Fund Name	Category	Code	Fund Name	Category	Code
UTI Top 100	Large Cap	M_1	HDFC Top 200	Large Cap	M_5
UTI Mid Cap	Small & Mid Cap	M_2	HDFC Mid-Cap Opportunities Fund	Small & Mid Cap	M_6
SBI Magnum Equity Fund	Large Cap	M_3	Kotak Select Focused Fund	Large Cap	M_7
SBI Magnum Mid Cap	Small & Mid Cap	M_4	Kotak Mid-Cap Fund	Small & Mid Cap	M_8

Source: Compiled by the Author from Association of Mutual Funds in India (AMFI, n.d. b.) and Money Control (n.d.).

Note: Codes are assigned by the Author.

(2) Measures Used for Performance Evaluation

(I) Return Measures : Investments are done in order to earn a reward. Returns may be defined as the reward earned from an investment. Monthly returns of the selected mutual fund schemes were computed using month-end NAVs by using the following formula :

$$R_{pt} = \frac{NAV_t - NAV_{t-1}}{NAV_{t-1}}$$

where, R_{pt} = fund returns, NAV_t = NAV in current month, NAV_{t-1} = NAV in previous month.

Similarly, the benchmark index return has been calculated as :

$$R_{mt} = \frac{index_t - index_{t-1}}{index_{t-1}}$$

where, R_{mt} = market return, $Index_t$ = market index in current month, $Index_{t-1}$ = market index in previous month.

(ii) Risk Measures : Investments are risky. Risk may be defined as the potential for variability in returns. Risks are neither good nor bad. Risk in an investment usually refers to the probability that the actual returns may be lesser as compared to expected returns. Higher the risk in an investment, higher are the returns generated by it. Basically, there are two types of risks - total risk, measured by standard deviation (σ) and systematic risk, measured by beta coefficient (β). The risk associated with the selected mutual fund schemes have been calculated on the basis of month-end NAV. The following measures of risks have been used in the study :

[i] Standard Deviation (σ): Standard deviation is a measure of volatility in returns as it measures the variations in returns of mutual funds from its expected returns. Higher standard deviation indicates higher risks involved in the investment. Total risk (σ) is computed as:

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

where, σ = standard deviation, n = number of monthly returns, R_t = Mutual fund returns, $\overline{R}$ = Mean mutual fund returns.

Similarly, standard deviation of market index is also calculated :

[ii] Beta (β) : Beta (β) measures the volatility in returns of an investment in terms of systematic risk and is calculated by relating the portfolio returns with the market returns. Beta of market usually has a value of 1. If fund beta is greater than 1, it indicates that the fund is more volatile than the market returns, which means that when the market index goes up (bull market condition), the fund will generate higher returns than the market returns, and this will be favourable for the investors ; whereas, on the other hand, if the market index goes down (bear market condition), the fund will generate lower returns than the market returns, and this will be unfavourable for the investors. If fund beta is less than 1, it indicates that the fund beta is less volatile than the market returns, which means when the market index goes up (bull market condition), fund returns will also increase, but it will generate lower returns as compared to the market returns, which is unfavourable for the investors, and on the other hand, when the market index goes down (bear market condition), the fund returns will also fall, but will fall lesser as compared to the market, which is favourable for the investors. And if fund beta is 1, it indicates that fund risk is equal to systematic risk, which means the fund returns will move in accordance with the market returns. Negative betas are rarely found. It is calculated by :

$$R_{pt} = \alpha + \beta_p R_{mt} + e_{pt}$$

where α = intercept, R_p = fund returns, β_p = beta coefficient, R_m = market returns, e_p = random error term, t = Time period.

[iii] Coefficient of Determination (R^2) : Coefficient of determination is a statistical measure to measure the correlation between the percent of fund movements that can be explained by movements in the benchmark index. It ranges between 0 to 100. If the value of R^2 lies between 85 to 100, it indicates that the fund's performance is correlated with its benchmark index (beta is reliable), and if it lies below 70, it indicates that the fund's performance is not correlated with its benchmark index (beta is unreliable). Since R^2 measures the correlation

existing between fund beta and benchmark index ; hence, it shows a degree of diversification. Higher the value of R^2, more reliable is the fund beta, and vice-versa.

[iv] Risk - Free Rate : Risk free rate has zero variability of returns. It has no correlation with risky assets. It is the base for performance evaluation of risky investments. In this study, average monthly yield of 91 days treasury bills have been considered as risk free rate, particularly because it is guilt - edged and of course, because of its easy accessibility. The yield on treasury bills are in annualized form, which have been converted into monthly figures. The average monthly yield on 91-days treasury bills (risk-free rate) from April 2010 to March 2017 comes out to be 0.0061 by using the following formula :

$$(1+r)^j = (1+R)$$
or
$$R = (1+r)^{12} - 1$$

where, R = annual risk - free rate ; r = Monthly risk - free rate ; j = 12, that is, number of months.

[v] Sharpe Ratio : Sharpe (1966) constructed an index to measure portfolio performance. It is referred to as reward to variability ratio. It is the ratio of average excess return of fund portfolios and standard deviation of the returns in a given period of time. It measures the return in relation to total risk of the portfolio and is based on capital market line (CML). Sharpe ratio judges the efficacy of fund managers in diversification of total risk and is a useful tool to evaluate the excess return per unit of total risk. It is believed that higher the Sharpe ratio, the better it is. It is calculated by:

$$SR_p = \frac{R_p - R_f}{\sigma_p}$$

where, SR_p = Fund Sharpe ratio, R_f = Return on risk-free asset, R_p = Fund returns , σ_p = standard deviation of fund returns.

Similarly, Sharpe ratio for the market is also calculated as :

$$SR_m = \frac{R_m - R_f}{\sigma_m}$$

where, SR_m = Market Sharpe ratio, R_m = market returns, R_f = Return on risk - free assets, σ_m = standard deviation of market returns.

If the fund Sharpe ratio is higher than the market Sharpe ratio, it indicates superior performance of the fund, and if the fund Sharpe ratio is lower than market Sharpe ratio, it indicates underperformance of the fund.

[vi] Treynor Ratio : Treynor (1965) gave another measure of performance evaluation, popularly known as Treynor ratio. It is quite similar to Sharpe ratio as it also measures excess returns generated by an investment over the risk free rate. Treynor ratio evaluates excess returns per unit of systematic risk, unlike Sharpe ratio which uses total risk. It is also known as reward-to-volatility ratio. Like the condition of Sharpe ratio, higher the Treynor ratio, the better it is :

$$TR_p = \frac{R_p - R_f}{\beta_p}$$

where, TR_p = Fund Treynor ratio, R_p = Fund returns, R_f = Return on risk-free assets, β_p = market risk for fund portfolio returns.

In the same manner, Treynor ratio for market may be computed as :

$$TR_m = \frac{TR_m - R_f}{\beta_m}$$

where, TR_m = Market Treynor ratio, $R_m - R_f$ = Excess market returns, β_m = systematic risk.

If the fund Treynor ratio is higher than market Treynor ratio, in indicates superior performance of the fund, and if the fund Treynor ratio is lower than the market Treynor ratio, it indicates underperformance of fund.

[vii] Jensen Measure : Jensen (1968) developed another methodology to measure the average return of a fund portfolio (above or below) as predicted by security market line (SML). It is popularly referred to as Jensen's alpha. It is beneficial as it assesses the ability of fund managers to generate higher returns for investors. A positive and significant Jensen alpha value is an indication that the fund has generated higher returns than CAPM returns. It is computed as :

$$R_{pt} - R_{ft} = \alpha + \beta_p (R_{mt} - R_{ft}) = e_{pt}$$
or
$$ER_{pt} = \alpha + \beta_p (ER_{mt}) + e_{pt}$$

where, α = Jensen alpha, R_{pt} = fund returns, R_{ft} = return on risk-free assets, R_{mt} = market returns, ER_{pt} = excess fund returns, ER_{mt} = excess market returns, β_p = systematic risk, e_{pt} = random error term, t = time period.

[viii] Sharpe - Differential Measure : William F. Sharpe used this method to measure the degree of excess returns earned by mutual fund managers for a given risk. Sharpe -differential measure is used to measure diversification and stock selection ability of fund managers and a positive value of Sharpe - differential measure is an indication that the fund has performed superior to market returns. If Jensen and Sharpe differential measures indicate same level of differential returns, then the portfolio is well diversified. Lower value of Sharpe differential indicates that the portfolio diversified poorly. It is computed as :

$$E(R_{pt}) = [R_{ft} + (R_{mt} - R_{ft}) \sigma_p / \sigma_m]$$
or
$$R_{pt} - [R_{ft} + (R_{mt} - R_{ft}) \sigma_p / \sigma_m]$$

where, R_{pt} = fund returns, R_{ft} = return on risk - free assets, R_{mt} = market returns, σ_p = standard deviation of fund returns, σ_m = standard deviation of market returns, t = Time period.

Empirical Analysis and Results

This section deals with discussion of empirical results of the study obtained by using measures of risk - returns as well as risk-adjusted performance measures. The value of beta (β) and coefficient of determination (R^2) of the sample schemes was obtained by regression analysis by taking mutual fund schemes' NAV returns as dependent variable and market index returns as independent variable. The results of overall sample schemes show that the

market index has a significant positive relation with returns of mutual fund schemes as beta coefficients of all sample schemes are positive and significant and values of R^2 of majority of the sample schemes lie between 85 to 100, and none lie below 70, which indicates that the sample schemes are well diversified.

(1) Results of Risk - Return Analysis : The Table 2 shows the risk - return analysis of public sector mutual fund schemes. Among all the sample schemes, M_2 is the riskiest scheme, whereas M_1 is the least risky in terms of total risk (σ_p). The average risk of sample schemes is lower than that of average market risk (σ_m). M_1 possesses lowest systematic risk (β), whereas M_2 is found to have highest systematic risk. All the sample schemes are found to possess systematic risk lower than the market risk, which always has beta value of 1. In terms of returns, it is observed that all the sample schemes generated greater returns than average market returns, while M_4 generated highest returns and M_3 generated lowest returns. The average returns of the sample schemes are greater than average market returns, which means that all the sample schemes outperformed the market.

Table 2. Results of Risk - Return of Public Sector Sample Schemes vs. Benchmark/Market Index

Mutual Fund Scheme	R_p	σ_p	R_m	σ_m	R_f	β_p	β_p *t*-value	R^2
M1	0.0096	0.0422	0.0079	0.0478	0.0061	0.84	28.38*	0.91
M2	0.0152	0.0529	0.0079	0.0478	0.0061	0.94	14.69*	0.73
M3	0.0081	0.0430	0.0079	0.0478	0.0061	0.88	39.44*	0.95
M4	0.0156	0.0507	0.0079	0.0478	0.0061	0.89	13.95*	0.71
Average	**0.0121**	**0.0472**	**0.0079**	**0.0478**	**0.0061**	**0.89**	**-**	**0.83**

Note: R_p= Fund return; σ_p= Fund risk; R_m= Market return; σ_m= Market risk; R_f = Risk-free rate; β_p= Fund beta; β_p *t*-value = Fund beta sig *t*-value; R^2 = Coefficient of determination ; *Significant at the 1% level.

Risk - return analysis of private sector sample schemes is depicted in the Table 3. It is observed that among all the sample schemes, M_8 is the riskiest scheme, whereas M_7 is the least risky scheme in terms of total risk (σ_p). The average risk of sample schemes is higher than the average market risk (σ_m). In terms of systematic risk (β), M_5 and M_6 possess highest and lowest systematic risk (β_p), respectively. Two sample schemes possess lower fund betas (β_p) than market beta (β_m) (which has a beta value of 1), and two sample schemes possess higher fund betas (β_p) than market beta (β_m). It is also observed that average fund beta of sample schemes is equal to market beta. However, in terms of returns, it is found that all sample schemes generated greater returns than average market returns, while M_5 and M_6 generated lowest and highest returns, respectively. The average returns of sample schemes is higher than average market returns, thereby indicating that all the sample schemes outperformed the market.

Table 3. Results of Risk - Return of Private Sector Sample Schemes vs. Benchmark/Market Index

Mutual Fund Scheme	R_p	σ_p	R_m	σ_m	R_f	β_p	β_p *t*-value	R^2
M5	0.0106	0.0537	0.0079	0.0478	0.0061	1.09	35.05*	0.94
M6	0.0169	0.0493	0.0079	0.0478	0.0061	0.91	16.81*	0.78
M7	0.0129	0.0466	0.0079	0.0478	0.0061	0.93	30.26*	0.92
M8	0.0146	0.0566	0.0079	0.0478	0.0061	1.06	18.16*	0.80
Average	**0.0138**	**0.0516**	**0.0079**	**0.0478**	**0.0061**	**1.00**	**-**	**0.86**

Note: R_p= Fund return; σ_p= Fund risk; R_m= Market return; σ_m= Market risk; R_f = Risk-free rate; β_p= Fund beta; β_p *t*-value = Fund beta sig *t*-value; R^2 = Coefficient of determination ; *Significant at the 1% level.

The overall risk - return analysis of both the sectors reveals that private sector schemes are riskier as compared to public sector schemes and hence, they also generate higher returns. The average returns of private sector sample schemes (0.0138) (Table 3) is greater than average returns of public sector sample schemes (0.0121) (Table 2), which clearly indicates rejection of H01 and acceptance of Ha1, that is, the private sector schemes outperformed public sector schemes as against benchmark/market index returns (in terms of risk and returns).

(2) Results of Sharpe Ratio : The Table 4 depicts the results of Sharpe ratio of public sector sample schemes as well as market index. It is observed that all the sample schemes outperformed the market index in terms of Sharpe ratio. Among all the sample schemes, M_4 is the best performer as it has the highest Sharpe ratio.

Table 4. Results of Sharpe and Treynor Ratios of Public Sector Sample Schemes & Benchmark/Market Index

Mutual Fund Scheme	SR_p	SR_m	Rank	TR_p	TR_m	Rank
M_1	0.0834	0.0366	3	0.0042	0.0018	3
M_2	0.1721	0.0366	2	0.0097	0.0018	2
M_3	0.0475	0.0366	4	0.0023	0.0018	4
M_4	0.1880	0.0366	1	0.0107	0.0018	1
Average	**0.1128**	**0.0366**	-	**0.0067**	**0.0018**	-

Note: SR_p = Sharpe ratio of fund; SR_m= Sharpe ratio of market; TR_p= Treynor ratio of fund; TR_m= Treynor ratio of market.

The Sharpe ratio of private sector sample schemes and market index is depicted in the Table 5. It is found that all the sample schemes outperformed the market index as they all have higher Sharpe ratios than the market index. M_6 is found to be the best performer as it has the highest Sharpe ratio.

In terms of Sharpe ratio, private sector sample schemes have an average of 0.1497, while public sector sample schemes have an average of 0.1128, which indicates that private sector funds outperformed the public sector funds. Since Sharpe ratio judges the efficacy of fund managers in diversification of total risk and is a useful tool to evaluate the excess returns per unit of total risk, therefore, it may be aptly said that private sector fund managers were more efficient in diversification of total risk, and hence, generated excess returns per unit of total risk.

(3) Results of Treynor Ratio : The Table 4 also depicts Treynor ratio of public sector sample schemes. In this case also, it is observed that all the sample schemes outperformed the market as they all have higher Treynor ratio than market Treynor ratio. M_4 is the best performer in the public sector in terms of Treynor ratio.

Treynor ratio of private sector sample schemes is depicted in the Table 5. All the sample schemes outperformed the market index in terms of Treynor ratio with M_6 as the best performer. Overall analysis of Treynor ratio of both the sectors reveals that private sector funds outperformed public sector funds as the former have a higher average of 0.0078 (Table 5) than the average of latter of 0.0067 (Table 4). Thus, it may be said that the private sector fund managers were more efficient in providing adequate risk - adjusted returns to investors on the basis of systematic risk.

It is possible that a fund which performs better in terms of Sharpe ratio may not perform equally well in terms of Treynor ratio and vice-versa, since Sharpe ratio usually adjusts returns per unit of total risk and Treynor ratio adjusts returns per unit of systematic risk. However, in our analysis, it is found that results of Sharpe and Treynor ratios give same ranking to the sample schemes, thereby indicating that fund managers of these schemes were able to provide sufficient risk - adjusted returns to their investors in terms of total as well as systematic risk.

Table 5. Results of Sharpe and Treynor Ratios of Private Sector Sample Schemes & Benchmark/Market Index

Mutual Fund Scheme	SR_p	SR_m	Rank	TR_p	TR_m	Rank
M_5	0.0838	0.0366	4	0.0041	0.0018	4
M_6	0.2189	0.0366	1	0.0119	0.0018	1
M_7	0.1454	0.0366	3	0.0073	0.0018	3
M_8	0.1506	0.0366	2	0.0080	0.0018	2
Average	**0.1497**	**0.0366**	-	**0.0078**	**0.0018**	-

Note: SR_p = Sharpe ratio of fund; SR_m= Sharpe ratio of market; TR_p= Treynor ratio of fund; TR_m= Treynor ratio of market.

Table 6. Results of Jensen Measure of Public Sector Sample Schemes

Mutual Fund Scheme	Fund Return (R_p)	Jensen Expected Return (CAPM Return)	Jensen Differential (Alpha)	Alpha p -Value
M_1	0.0096	0.0076	0.0020	0.1500
M_2	0.0152	0.0078	0.0075	0.0168**
M_3	0.0081	0.0076	0.0005	0.6330
M_4	0.0156	0.0077	0.0080	0.0104**
Average	**0.0121**	**0.0077**	**0.0045**	-

Note : **Significant at the 5% level.

(4) Results of Jensen Measure : The Table 6 represents Jensen expected returns, Jensen alpha, and p - values of public sector sample schemes. It is observed that all sample schemes have positive alpha values. However, the p - values of only two schemes (M_2 and M_4) are found to be significant, which indicates that fund managers of these schemes possessed superior stock selectivity skills, and hence, were able to generate greater returns than the expected returns. M_4 generates highest alpha followed by M_2.

The Table 7 depicts Jensen expected returns, Jensen alpha, and p - values of private sector sample schemes. It is found that all sample schemes have positive and significant alpha. This means that fund mangers of all sample schemes possessed superior stock selectivity skills and ,therefore, were able to generate returns higher than expected returns. M_6 generates highest alpha followed by M_8.

The overall results of Jensen - differential measure reveal that in the public sector, only two schemes have positive and significant alpha ; whereas, in the private sector, all four sample schemes have positive and significant alpha values. Furthermore, the average Jensen alpha value of public sector sample schemes is 0.0045 (Table 6), while that of private sector sample schemes is 0.0059 (Table 7). This clearly shows that private sector fund managers possessed superior stock selection skills as compared to public sector fund managers.

Table 7. Results of Jensen Measure of Private Sector Sample Schemes

Mutual Fund Scheme	Fund Return (R_p)	Jensen Expected Return (CAPM Return)	Jensen Differential (Alpha)	Alpha p -Value
M_5	0.0106	0.0080	0.0026	0.0823***
M_6	0.0169	0.0077	0.0092	0.0006*
M_7	0.0129	0.0077	0.0051	0.0008*
M_8	0.0146	0.0080	0.0067	0.0187**
Average	**0.0138**	**0.0079**	**0.0059**	-

Note : *Significant at 1% level ; **Significant at 5% level ; ***Significant at 10% level

Table 8. Results of Sharpe - Differential Measure of Public Sector Sample Schemes

Mutual Fund Scheme	Fund Return (R_p)	Sharpe Expected	Sharpe - Differential
M_1	0.0096	0.0076	0.0020
M_2	0.0152	0.0080	0.0072
M_3	0.0081	0.0077	0.0005
M_4	0.0156	0.0080	0.0077
Average	**0.0121**	**0.0078**	**0.0044**

Table 9. Results of Sharpe - Differential Measure of Private Sector Sample Schemes

Mutual Fund Scheme	Fund Return (R_p)	Sharpe Expected	Sharpe - Differential
M_5	0.0106	0.0081	0.0025
M_6	0.0169	0.0079	0.0090
M_7	0.0129	0.0078	0.0051
M_8	0.0146	0.0082	0.0065
Average	**0.0138**	**0.0080**	**0.0058**

(5) Results of Sharpe - Differential Measure : Sharpe expected and Sharpe - differential returns of public sector sample schemes are depicted in the Table 8. It is found that all sample schemes have positive Sharpe - differential returns, thereby indicating superior performance of these funds, which means that fund managers of these schemes possessed stock selection skills, and hence, were successful in generating more than expected returns. M_4 (0.0077) is the best performer as it has the highest Sharpe - differential returns followed by M_2 (0.0072).

The Table 9 presents Sharpe expected and Sharpe-differential returns of private sector sample schemes. It is observed that all the four sample schemes have positive Sharpe - differential returns, which is indicative of superior performance of these schemes. This means that fund managers of these schemes possessed stock selection skills and successfully generated greater than expected returns. M_6 (0.0090) is the best performer followed by M_8 (0.0065).

The overall findings of Sharpe - differential reveal that average Sharpe - differential of public sector sample schemes is 0.0044 (Table 8), while that of private sector sample schemes is 0.0058 (Table 9), which is higher. This indicates that private sector funds have superior performance than public sector funds, given their corresponding level of total risk.

It is pertinent to note here that for a well - diversified portfolio, Jensen - differential (alpha) and Sharpe - differential are the same ; whereas, in case of a poor diversified portfolio, Sharpe-differential return is smaller in magnitude, indicative of poor performance. However, this study reveals that Jensen-differential (alpha) as well as Sharpe - differential returns of public sector funds are almost the same. Similarly, for private sector also, the Jensen - differential (alpha) as well as Sharpe - differential returns are almost the same, thereby indicating that both sectors have well diversified portfolios. Furthermore, Jensen - differential (alpha) and Sharpe - differential returns of private sector funds are higher in comparison to the public sector, which shows that private sector sample schemes are better than public sector sample schemes.

On the basis of analysis of risk-adjusted measures of performance, that is, Sharpe ratio, Treynor ratio, Jensen measure, and Sharpe - differential measure, H02 is rejected and Ha2 is accepted, thereby indicating that the private sector schemes exhibit superior performance than public sector schemes as compared to benchmark/market index (in terms of risk - adjusted performance measures). Furthermore, the results of Jensen's measure provide a basis of

rejection of H03 and acceptance of Ha3 that the private sector fund managers possessed better stock selection skills as compared to public sector fund managers.

Summarized Findings

The Table 10 shows the summarized findings of the study. It shows that in terms of risk, public sector mutual funds (4.72%) are less risky and private sector mutual funds (5.16%) are riskier as compared to the market index (4.78%). It is observed that in terms of returns, both the sectors performed better than risk-free rate and market index, but in terms of generating absolute returns, the private sector outperformed the public sector. Furthermore, the risk - adjusted performance shows that in terms of Sharpe ratio, although both the sectors outperformed the market Sharpe ratio (3.66%), but the private sector (14.97%) outperformed the public sector (12.28%). Similar results are obtained in terms of Treynor ratio also, where both the sectors outperformed the market Treynor ratio (0.18%), but private sector funds' (0.78%) performance was superior to the public sector funds (0.67%). The results of Jensen - differential (alpha) show that private sector fund managers possessed superior stock selection skills and generated positive and significant alpha for all four sample schemes as compared to public sector, in which only two schemes generated positive and significant alpha. The results of Sharpe-differential reveal that although fund managers of both sectors possessed stock selection and diversification skills, but private sector fund managers were found to be superior as they were able to generate higher differential returns.

Table 10. Summarized Results

	Public Sector		Private Sector	
Risk-Return Measure	**Mean Value**	**Risk-Return Measure**	**Mean Value**
Fund Return (%)	1.21	Fund Return (%)	1.38
Risk-free Return (%)	0.61	Risk-free Return (%)	0.61
Market Return (%)	0.79	Market Return (%)	0.79
Fund Risk *(SD)* (%)	4.72	Fund Risk *(SD)* (%)	5.16
Market Risk *(SD)* (%)	4.78	Market Risk *(SD)* (%)	4.78
Fund Systematic Risk/Beta	0.8875	Fund Systematic Risk/Beta	0.9975
Risk-Adjusted Performance Measure	**Mean Value (%)**	**Risk-Adjusted Performance Measure**	**Mean Value (%)**
Sharpe Fund	12.28	Sharpe Fund	14.97
Sharpe Benchmark	3.66	Sharpe Benchmark	3.66
Treynor Fund	0.67	Treynor Fund	0.78
Treynor Benchmark	0.18	Treynor Benchmark	0.18
Jensen Alpha	0.45		0.59
	(2 schemes have positive and significant alpha)	Jensen Alpha	(All 4 schemes have positive and significant alpha)
Sharpe - Differential	0.44	Sharpe - Differential	0.58

Conclusion

This study focuses on comparative evaluation of investment performance of select mutual fund schemes of public and private sector using risk-return as well as risk - adjusted performance measures for a period of 84 months, that

is, from April 2010 to March 2017. It is observed that market index influenced the behaviour of mutual fund returns. The sample schemes also have high values of R^2, indicating better diversification of portfolio. Furthermore, R^2 of private sector is greater than that of public sector, which is indicative of superior diversification of portfolio. The beta coefficients of all public sector sample schemes are less than 1, which means that these mutual funds have followed a defensive investment policy. On the other hand, two schemes of private sector have beta coefficients greater than 1, which means that these funds have followed an aggressive investment policy.

The overall risk - return analysis of both the sectors reveals that private sector schemes are riskier as compared to public sector schemes and hence, they also generate higher returns. The average returns of private sector sample schemes (0.0138) is greater than average returns of public sector sample schemes (0.0121), which clearly means that private sector funds performed better than public sector funds in terms of risk - return. The results of risk-adjusted performance measures such as Sharpe ratio, Treynor ratio, Jensen measure, Sharpe - differential measure also reveal similar results that private sector schemes have superior performance than public sector schemes as compared to the benchmark index. Jensen-differential measure reveals that in case of all public sector schemes, only two schemes have positive and significant alpha ; whereas, in case of the private sector, all the sample schemes have positive and significant alpha values. Furthermore, the average Jensen alpha value of public sector sample schemes is 0.0045, while that of private sector sample schemes is 0.0059. This clearly shows that private sector fund managers possessed better stock selection skills as compared to public sector fund managers.

Overall, the major reason behind superior performance of private sector funds may be attributed to efficient stock selection and diversification skills of fund managers. The findings of the present study are in conformity with previous studies such as that of Kandpal and Kavidayal (2014), Tomer and Khan (2015), and Rathore and Singh (2017) as all these studies observed that private sector funds performed better than the public sector funds.

Research Implications

The empirical results of the present study point towards certain research implications. Firstly, the sample schemes of both - public and private sector outperformed the market index, however, the private sector funds were relatively better as compared to the public sector funds in terms of risk return analysis as well as risk - adjusted measures of investment performance. This means that the public sector funds failed to compete with the private sector funds. Hence, the public sector needs to focus on overcoming their weaknesses and exhibit an improved investment performance. This can be done in different ways, for example, if the public sector fund managers adopt a better diversification strategy by investing in a diversified portfolio of securities. Secondly, the study found that private sector fund managers possessed superior stock selection skills. Hence, there is a need that the public sector fund managers improve their stock selection skills. This can be done if the fund managers adjust the fund beta in accordance with the market movements, that is, invest in high beta stocks in up market conditions and in low beta stocks in down market conditions. It was also observed that small & mid cap category of schemes of both public and private sectors were the top performers during the entire study period, thereby indicating that the fund managers should focus on improving the investment performance of the large cap category of schemes. Finally, the present study observed that overall, the private sector outperformed the public sector funds in all the aspects, thus providing the investors a basis for making informed investment decisions.

Limitations of the Study

The present study is not free from limitations. Certain limitations of the study are as follows: The sources of data were secondary in nature. Hence, the accuracy of the findings of the study is restricted to the authenticity of the

data. The availability of NAV data on the respective websites of the fund houses served as the basis for selection of the sample schemes. Since the study is based upon equity oriented schemes, BSE 100 was taken as the market/benchmark index because as per SEBI, in case of equity oriented schemes, mutual funds may appropriately select any of the indices available, (e.g. BSE (Sensitive) Index, S&P, CNX Nifty, BSE 100, BSE 200 or S&P CNX 500, etc.) as a benchmark index depending upon the investment objective and portfolio (Bhanot, 2012). In the present study, 91 days treasury bills have been taken as risk - free rate due to the availability and easy accessibility of the data. The time frame of the study is restricted to 7 financial years because analysis for more than 5 financial years is considered satisfactory to determine the long - run sustainable investment performance of the mutual fund schemes.

Scope for Further Research

The study suggests a few aspects for further research, such as:

✧ A study may be conducted to analyze the market - timing ability of the fund managers by using market-timing models such as Treynor - Mazuy (1966) and Henriksson-Merton (1981).

✧ The present study conducted risk - return analysis and applied risk-adjusted measures for evaluating investment performance of sample schemes. Further studies may be done by applying other methodologies such as data envelopment analysis (DEA), Fama - French three factor model, Carhart four factor model, etc. to analyze the performance of mutual funds.

✧ The present study focused on monthly NAV data for performance evaluation of mutual fund schemes. Another study can be conducted based on daily NAV data.

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