Testing of Performance Measures on Mutual Fund Debt Schemes: An Empirical evidence in India

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Abstract

We examine the performance of private and public mutual fund debt schemes in India. We use yearly NAVs of two hundred thirty-four debt schemes, Sensex and Treasury bill yield for the study period from April 2006 to March 2021. We apply time series plot, Quandt likelihood ratio (QLR) test, cumulative sum (CUSUM) test, compounded annual growth rate (CAGR using Geo-mean), performance measures and comparison with Nifty 10 yr. benchmark G-sec Index. The result of time series plot QLR test shows no structural break in the data and no change in parameter and further result show that no significance difference between private and public sector mutual fund debt schemes.

Keywords: NAV, CAGR, Sharpe, Treynor, Jensen, Sortino and time series plot.

Introduction

A mutual fund is an investment scheme that collects money from individuals and invests it in a variety of assets. The funds raised from various investors are typically invested in financial securities such as stocks and money-market instruments such as certificates of deposit and bonds. Asset classes are broadly classified as equity, debt, and money-market instruments. These investments could be made in the short, medium, or long term. Nalini and Tripathy (2005) found that analysed the market timing abilities of Indian fund manager in form of two models. There is only one scheme where market timing ability of the fund managers was shown. Rao(2006) focused on selected open-ended shares. The results exhibited that open ended schemes have made high returns than that of higher risk. Kavita (2009) focused on ELSS schemes analysing performance measures the results shows that ELSS performance is better comparison with its benchmarks. Debashish (2009) found that tax plans have performed intensely performance when measured against the benchmark. Khalid and et.al (2009) found that the Sortino Ratio, which dealt only with downside risk, the results measures given under different ratios had a nearly identical relationship between risk and return. Koulis and et.al(2011) found to attract new domestic and foreign investors, the management of mutual funds must become more

significant, so that the return on their portfolio is more attractive than the typical market return. Rahman and et.al (2012) found that growth-oriented mutual funds have not outperformed their benchmark indicators. Some of the funds outperformed the benchmark for systemic risk, & most of the funds did not outperform the benchmark for volatility. Sahil Jain (2012) the results show that, over the last 15 years, private sector mutual fund companies have outperformed public sector mutual fund companies. Vanaja and Karrupawamy (2013) study focused on the performance measures of selected five private sector balanced schemes out of five only two schemes are earned returns above the average returns and Sharpe ratio is positive for all the schemes. Jitendra and Anindita (2015) found that private sector tax saving mutual fund schemes have outperformed as compared to its market return and the performances of public sector tax saving mutual fund schemes were not satisfactory. Nandhini and Rathnamani (2017) found that there is an impact of mutual fund flow in the Indian equity markets. Volatility and uncertainty are part and parcel of equity investing. Shruthi and Manjunatha (2018) argue that 10 per cent of the schemes have high return and lower risk, 10 per cent of the schemes have negative return and 80 per cent of the schemes have high risk and lower return. Chitra and Hemalatha (2018) found that measures results were useful for investors. Antoch et.al (2019) found that testing procedure works well in the framework of the four factors CAPM model and estimate the breaks in the monthly returns of US mutual funds. Shruthi and Manjunatha (2019) argue that investing in equity schemes would be beneficial for investors during the study period. The literature review shows that many researchers are focused on risk return analysis and performance measures. Our study is particularly focusing on comparison analysis of private and public mutual fund debt schemes performance in India using structural break, CAGR, performance measures and comparison of schemes with benchmark.

Objectives and Methodology

We have set following objective based on the evidence of review of literature

- To measure the performance of private and public sector mutual fund debt schemes in India.

Data Sample and Methodology

This paper focuses on analysis and comparison of performance of debt schemes both for private and public sector mutual funds. We use annual NAV of 169 debt schemes of private sector mutual fund and 65 debt schemes of public sector mutual funds for 15 years study period from April 2006-07 to March 2020-21 to calculate CAGR, Nifty 10 year benchmark G-sec Index returns as market proxy and 91-day treasury bill rate is considered as risk-free rate. The time-series plot of the CAGR suggests the possibility of structural break. Quandt Likelihood Ratio (QLR) test and Cumulative Sum (CUSUM) test for structural break indicates that there is no structural break. Hence, entire 15-years window is considered for analysis. Kolmogorov-Smirnov test and Shapiro-wilk test are used for testing the normality of the CAGR data. Further, Mann-Whitney test is performed to check whether there is significant difference in the returns of debt schemes of public and private mutual funds. We calculate performance of selected 234 debt schemes by using Sharpe, Treynor, Jensen and Sortino measure and tested for their normality. Mann-Whitney test is performed for ascertaining whether there is significant difference in these performance measures for debt schemes of public and private mutual funds. Nifty 10 yr. benchmark G-sec Index returns is identified as benchmark and CAGR of return is calculated for the same 15-year window. Classification of public and private sector schemes are made on the basis of their CAGR as 'above' and 'below' benchmark. Chi-square test of independence is used for ascertaining whether there is significant relationship between 'type of mutual fund scheme' and 'performance against benchmark'.

Tools for analysis:

Calculation of rate of return and average return

$$\text{Return} = \frac{NAV_1 - NAV_0}{NAV_0} \qquad \ldots. (1)$$

Average Return (AR)

$$AR = \frac{Sum of\ return}{No of\ returns} \qquad \ldots (2)$$

First criterion to check the performance of mutual fund we used CAGR using geomean: it is calculated using annual returns of the schemes and to plot time series to test structural break in sample data. For time series plot we used QLR test and CUSUM test. If there is no structural break entire 15-year data can be considered as single window for analysis. Formula for CAGR:

$$CAGR = \left(\frac{Ending\ value}{Begining\ value}\right)^{1}/n - 1 \quad \ldots (3)$$

a. Kolmogorov-Smirnov Test and Shapiro-wilk test has been used for testing the normality of the CAGR Data. To choose parametric or non-parametric test for testing hypothesis.

b. Non-parametric test: Mann Whitney test is used for testing hypothesis for private and public mutual fund debt schemes.

c. Parametric test: Independent sample T-test used for testing hypothesis for private and public mutual fund debt schemes.

Second criterion is performance measures viz: Sharpe, Treynor, Jensen and Sortino are calculated. Related formulas are listed below:

a. Sharpe Measure (SM): It shows excess of return on portfolio over the risk-free rate in relative to its standard deviation.

$$S_i = \frac{Ri - Rf}{\sigma^2} \quad \ldots (4)$$

b. Standard deviation (SD): It is the square root of the variance & measures the spreading of a dataset comparative to its mean. Square root of variance is determined by calculating the variation between each data point values from the mean.

$$SD = \sqrt{\sum} (xi - \bar{x})\ 2/N \quad \ldots (5)$$

c. Treynor Measure (TM): If the measure is higher than benchmark and portfolio has overtaken the market & it indicates high risk adjusted performance.

$$T_i = \frac{Ri - Rf}{\beta i} \quad \ldots (6)$$

d. Beta(β): It is mainly related to volatility with the schemes compared with benchmark.

$$\beta = \frac{Asecuritycovarianceofmarketportfolio}{varianceofmarketportfolio} \quad \ldots (7)$$

e. Jensen Measure (JM): To determine scheme is making the Systematic return for its risk. If it is positive than the scheme, it is earning more returns.

$$JM = (Ri - Rf) + \beta\ (Rm - Rf) \quad \ldots (8)$$

f. Sortino Measure (SoM): Total volatility by using the assets standard deviation of negative portfolio returns.

$$S_{id} = \frac{Ri - Rf}{d\sigma^2} \quad \ldots (9)$$

g. Kolmogorov-Smirnov Test and Shapiro-wilk Test are used for testing the normality of the CAGR Data. To choose parametric or non-parametric test for testing hypothesis.

h. non-parametric test: Mann Whitney test is used for testing hypothesis for private and public mutual fund schemes.

i. Parametric test: Independent sample T-test used for testing hypothesis for private and public mutual fund schemes. For the calculation of these measures, annual 91-day T-bills (treasury bill) rate is considered as risk-free rate (Rf) wherever required.Nifty 10 yr. benchmark G-sec Index is identified as benchmark for debt schemes, drawn from BSE India.

Third criterion we used to compare the performance of mutual fund schemes with market proxies: Chi-square test of independence is used for ascertaining whether there is a significant relationship between 'type of mutual fund scheme' and 'performance against benchmark.' Post Hoc test is used if there is significant relationship between 'type of mutual fund scheme' and 'performance against benchmark.

Results and Analysis

Graph 1: indicate a possibility of structural break of the data. For confirmation we use QLR test and CUSUM test. The QLR test results for structural break null hypothesis is no structural break and test statistic: chi-square (1) = 7.92787 at observation 2014 with asymptotic p-value = 0.0650168. CUSUM test results for parameter stability null hypothesis is no change in parameters and test statistic: Harvey-Collier t (13) = -0.500262 with p-value = P (t (13) > -0.500262) = 0.625252. Both the test suggests that there was no structural break (p-value is exceeding 5percent).

Hence, entire 15-year period has been considered as a single window for analysis of performance of Mutual fund debt schemes.

Table 1: The average CAGR suggest that the performance of both public and private sector Debt schemes is similar, however the maximum and minimum returns of both the schemes indicate a contrary outcome. Hence, there is a need to check whether the performance of public sector and private sector mutual fund debt schemes are same or different. For enabling testing of the above, it is essential to check whether the data has been normally distributed or not. Kolmogorov-Smirnov and Shapiro-Wilk tests were applied to check for normality of the CAGR data.

Table 2: The test result indicates that the CAGR data is not normally distributed (being significant at 1percent). Hence, for ascertaining whether there is a significantdifferencein the returns of public and private sector mutual fund debt schemes, non-parametric test has to be applied. Since the variable 'type of mutual fund' which is a nominal data has only two classifications (public sector and private sector), and the other variable 'CAGR' is a scale data, Mann-Whitney U test has been used.

Table 3 The results shows that null hypothesis 'there is no significance difference in the returns of public and private sector mutual fund Debt schemes' is accepted (sig. value having exceeded 5percent).

Table 4 indicates for enabling testing of the above, it is essential to check whether the data has been normally distributed or not. Kolmogorov-Smirnov and Shapiro-Wilk tests were applied to check for normality of the performance measures data.

Table 5 The test result indicates that the performance measures data is not normally distributed for Sharpe, Treynor, Jensen and Sortino measures (being significant at 1percent). Hence, for ascertaining whether there is a significantdifferencein the performance of public and private sector mutual fund debt schemes, non-parametric test has to be applied for Sharpe, Treynor, Jensen and Sortino measures. Since the variable 'type of mutual fund' which is a nominal data has only two classifications (public sector and private sector), and the other variable 'SM, TM, JM and SoM' is a scale data, Mann-Whitney U test has been used.

Table 6 The null hypothesis 'there is no significance difference in the performance of public and private sector mutual fund Debt schemes with regards to Sharpe, Treynor, Jensen and Sortino measures' is accepted (sig. value having exceeded 5percent).

Table 7 indicates for ascertaining whether 'performance against benchmark' is dependent upon the type of scheme, Chi-square test is applied (since both criteria in the above table are nominal data).

Table 8 The results indicates that there is no significance relationship between types of schemes and benchmark returns of public and private sector Debt mutual funds with regard to performance against benchmark (since p value for Pearson Chi-square test has exceeded 5percent).

Summary and Conclusion

We examine the compounded annual growth rate of debt schemes in private and public mutual funds. Firstly, we used time series plot to check structural break in data, CAGR, Performance Measures and benchmark comparison. The results indicates that no structural break in the data and no parameter stability. The average CAGR and Performance measures suggest that the performance of both public and private sector schemes is similar, however the maximum and minimum returns of both the schemes indicate a contrary outcome. Hence, we test hypothesis to check whether the performance of public sector and private sector mutual fund schemes are same or different. The results shows that there is no significance difference between private and public sector mutual fund debt schemes.

Implication and Scope for further Research

The results of the study may be used by researchers to compare with other foreign mutual funds schemes which will help for investment decision. We have analysed only debt schemes and further studies can include hybrid schemesin private and public sector mutual funds. Further studies can be undertaken to test the relationship between mutual fund schemes return and risk by applying asset pricing models and R-squared calculation are used to analyse the mutual fund performance.

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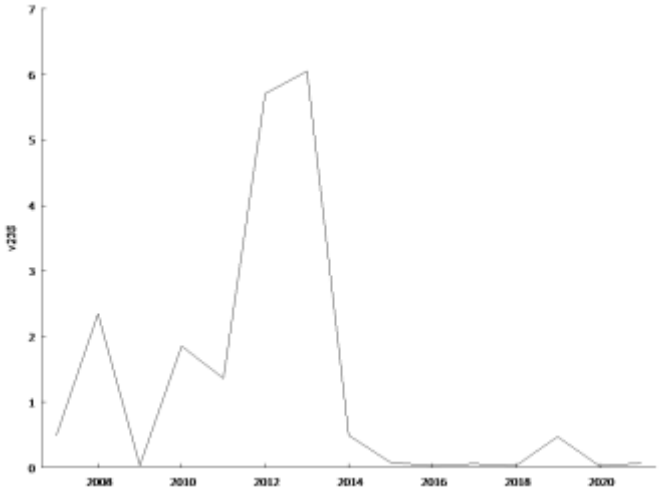
Time Series Plot of Average Returns of all Private and Public Sector Debt Schemes

Graph 1 Time Series Plot of Average Returns of all Schemes



Note: X axis indicate years i.e., from 2008-2021. Y axis indicates average return of all 234 schemes of private and public sector Debt mutual fund.
Source: drawn by researcher using Gretel software.

Table 1: CAGR of Private and Public Sector Mutual Fund DebtSchemes:

Schemes	CAGR	Schemes	CAGR	Schemes	CAGR
PVTMFD-001	0.0408	PVTMFD-079	0.0724	PVTMFD-157	0.0098
PVTMFD-002	0.0687	PVTMFD-080	0.0000	PVTMFD-158	0.3594
PVTMFD-003	0.0076	PVTMFD-081	0.0000	PVTMFD-159	0.3527
PVTMFD-004	0.4516	PVTMFD-082	0.0066	PVTMFD-160	0.3597
PVTMFD-005	0.3594	PVTMFD-083	0.0763	PVTMFD-161	0.3598
PVTMFD-006	0.3293	PVTMFD-084	0.0086	PVTMFD-162	0.4644
PVTMFD-007	0.3594	PVTMFD-085	-0.0002	PVTMFD-163	0.0066
PVTMFD-008	0.3386	PVTMFD-086	0.0753	PVTMFD-164	0.0841
PVTMFD-009	0.4603	PVTMFD-087	0.0845	PVTMFD-165	0.0269
PVTMFD-010	0.0778	PVTMFD-088	0.0884	PVTMFD-166	0.0784
PVTMFD-011	0.1056	PVTMFD-089	0.0178	PVTMFD-167	0.0733
PVTMFD-012	0.0014	PVTMFD-090	0.0798	PVTMFD-168	0.0000
PVTMFD-013	0.0807	PVTMFD-091	0.0086	PVTMFD-169	0.0195
PVTMFD-014	0.0009	PVTMFD-092	0.0728	PSMFD-001	0.0776
PVTMFD-015	0.0845	PVTMFD-093	0.0082	PSMFD-002	0.0495
PVTMFD-016	0.0188	PVTMFD-094	0.0222	PSMFD-003	0.4543
PVTMFD-017	0.2535	PVTMFD-095	0.0255	PSMFD-004	0.3597
PVTMFD-018	0.1659	PVTMFD-096	0.0225	PSMFD-005	0.4543
PVTMFD-019	0.1659	PVTMFD-097	0.0318	PSMFD-006	0.0845
PVTMFD-020	0.1659	PVTMFD-098	0.2655	PSMFD-007	0.0846
PVTMFD-021	0.1659	PVTMFD-099	0.0888	PSMFD-008	0.0845
PVTMFD-022	0.1659	PVTMFD-100	0.0049	PSMFD-009	0.0474
PVTMFD-023	0.2515	PVTMFD-101	0.0810	PSMFD-010	0.4371
PVTMFD-024	0.2498	PVTMFD-102	0.0188	PSMFD-011	0.4021
PVTMFD-025	0.2544	PVTMFD-103	0.0688	PSMFD-012	0.4491
PVTMFD-026	0.2572	PVTMFD-104	0.0690	PSMFD-013	0.4491
PVTMFD-027	0.1663	PVTMFD-105	0.0228	PSMFD-014	0.4231
PVTMFD-028	0.1666	PVTMFD-106	0.4612	PSMFD-015	0.4577
PVTMFD-029	0.1659	PVTMFD-107	0.0000	PSMFD-016	0.0740
PVTMFD-030	0.2482	PVTMFD-108	0.0717	PSMFD-017	0.0067
PVTMFD-031	0.1659	PVTMFD-109	0.0020	PSMFD-018	0.0686
PVTMFD-032	0.1659	PVTMFD-110	0.0746	PSMFD-019	0.0075
PVTMFD-033	0.2558	PVTMFD-111	0.0100	PSMFD-020	0.3728
PVTMFD-034	0.1659	PVTMFD-112	0.0364	PSMFD-021	0.3914
PVTMFD-035	0.2609	PVTMFD-113	0.0667	PSMFD-022	0.4575
PVTMFD-036	0.2587	PVTMFD-114	0.0127	PSMFD-023	0.0363
PVTMFD-037	0.0029	PVTMFD-115	0.0127	PSMFD-024	0.0667
PVTMFD-038	0.1044	PVTMFD-116	0.0000	PSMFD-025	0.0748
PVTMFD-039	0.1044	PVTMFD-117	0.0000	PSMFD-026	0.0113
PVTMFD-040	0.1665	PVTMFD-118	0.0741	PSMFD-027	0.0278
PVTMFD-041	0.1672	PVTMFD-119	0.0000	PSMFD-028	0.0363
PVTMFD-042	0.2591	PVTMFD-120	0.0061	PSMFD-029	0.0758

Schemes	CAGR	Schemes	CAGR	Schemes	CAGR
PVTMFD-043	0.0913	PVTMFD-121	0.0695	PSMFD-030	0.0678
PVTMFD-044	0.0290	PVTMFD-122	0.0011	PSMFD-031	0.0251
PVTMFD-045	0.1660	PVTMFD-123	0.0125	PSMFD-032	0.1313
PVTMFD-046	0.2535	PVTMFD-124	0.0107	PSMFD-033	0.0747
PVTMFD-047	0.1685	PVTMFD-125	0.0084	PSMFD-034	0.0144
PVTMFD-048	0.1659	PVTMFD-126	0.0678	PSMFD-035	0.0613
PVTMFD-049	0.1661	PVTMFD-127	0.0073	PSMFD-036	0.0739
PVTMFD-050	0.1607	PVTMFD-128	0.0120	PSMFD-037	0.0022
PVTMFD-051	0.0864	PVTMFD-129	0.0039	PSMFD-038	0.4096
PVTMFD-052	0.0065	PVTMFD-130	0.0126	PSMFD-039	0.0606
PVTMFD-053	0.0070	PVTMFD-131	0.0797	PSMFD-040	0.0283
PVTMFD-054	0.0793	PVTMFD-132	0.0265	PSMFD-041	0.0783
PVTMFD-055	0.1660	PVTMFD-133	0.0182	PSMFD-042	0.0297
PVTMFD-056	0.2522	PVTMFD-134	0.0929	PSMFD-043	0.0305
PVTMFD-057	0.1664	PVTMFD-135	0.0928	PSMFD-044	0.0284
PVTMFD-058	0.1664	PVTMFD-136	0.3594	PSMFD-045	0.0327
PVTMFD-059	0.0861	PVTMFD-137	0.3610	PSMFD-046	0.0779
PVTMFD-060	0.0079	PVTMFD-138	0.3599	PSMFD-047	0.0319
PVTMFD-061	0.0089	PVTMFD-139	0.4059	PSMFD-048	0.0237
PVTMFD-062	0.1065	PVTMFD-140	0.3530	PSMFD-049	0.0736
PVTMFD-063	0.1065	PVTMFD-141	0.4452	PSMFD-050	0.0736
PVTMFD-064	0.0145	PVTMFD-142	0.3637	PSMFD-051	0.0804
PVTMFD-065	0.0847	PVTMFD-143	0.0162	PSMFD-052	0.0257
PVTMFD-066	0.4604	PVTMFD-144	0.0745	PSMFD-053	0.4619
PVTMFD-067	0.0782	PVTMFD-145	0.0249	PSMFD-054	0.3657
PVTMFD-068	0.0031	PVTMFD-146	0.1235	PSMFD-055	0.0403
PVTMFD-069	0.0676	PVTMFD-147	0.1235	PSMFD-056	0.0806
PVTMFD-070	0.0011	PVTMFD-148	0.0778	PSMFD-057	0.0252
PVTMFD-071	0.0042	PVTMFD-149	0.0084	PSMFD-058	0.0254
PVTMFD-072	0.0079	PVTMFD-150	0.0803	PSMFD-059	0.4540
PVTMFD-073	0.0015	PVTMFD-151	0.0053	PSMFD-060	0.3629
PVTMFD-074	0.0015	PVTMFD-152	0.0013	PSMFD-061	0.0180
PVTMFD-075	0.0660	PVTMFD-153	0.0067	PSMFD-062	0.3595
PVTMFD-076	0.0828	PVTMFD-154	0.0455	PSMFD-063	0.4601
PVTMFD-077	0.0050	PVTMFD-155	0.0805	PSMFD-064	0.0703
PVTMFD-078	0.0035	PVTMFD-156	-0.0024	PSMFD-065	0.0055
Average of CAGR PVTMFD		0.113	Average of CAGR PSMFD		0.158
Maximum CAGR PVTMFD		0.464	Maximum CAGR PSMFD		0.461
Minimum CAGR of PVTMFD		-0.002	Minimum CAGR of PSMFD		0.002

Source: CAGR of private and public sector mutual funds Debt schemes.

Note 1: First, third and fifth column indicates the codes (for private sector schemes we coded as PVTMFD-001to PVTMFD -169 and for public sector schemes coded as PSMFD-001 to PSMFD-065).

Note 2: Second, fourth and sixth column of the table indicate CAGR of the schemes for the study period.

Table 2 Tests of Normality of Private and Public Sector Mutual Fund Debt Schemes.

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CAGR	.247	234	**.000**	.791	234	**.000**

Note: we have computed test of normality by using SPSS 22 software.

Table 3 Mann-Whitney Test Result of Private and Public Sector Mutual Fund DebtSchemes

Test Statistics[a]	
	CAGR
Mann-Whitney U	4704.000
Wilcoxon W	19069.000
Z	-1.700
Asymp. Sig. (2-tailed)	**.089**

Table 4 Performance Measures of Private and Public Sector Mutual Fund Debt Schemes:

Schemes	SM	TM	JM	SoM	Schemes	SM	TM	JM	SoM
PVTMFD-001	-0.73	-0.27	-0.02	-0.07	PVTMFD-118	0.38	0.07	0.01	0.02
PVTMFD-002	0.05	0.00	0.01	0.01	PVTMFD-119	0.00	0.00	-0.07	-0.18
PVTMFD-003	-3.03	-0.91	-0.06	-0.16	PVTMFD-120	-17.78	-61.76	-0.06	-0.16
PVTMFD-004	0.26	0.05	9.35	18.63	PVTMFD-121	0.12	0.02	0.00	0.01
PVTMFD-005	0.26	0.05	8.55	16.98	PVTMFD-122	-5.87	0.84	-0.07	-0.17
PVTMFD-006	0.25	0.05	8.52	16.92	PVTMFD-123	-0.71	0.09	-0.06	-0.14
PVTMFD-007	0.26	0.05	8.56	17.01	PVTMFD-124	-16.54	-13.58	-0.06	-0.15
PVTMFD-008	0.25	0.05	8.54	16.97	PVTMFD-125	-1.46	0.17	-0.06	-0.15
PVTMFD-009	0.26	0.05	9.43	18.78	PVTMFD-126	0.03	-0.01	0.00	0.00
PVTMFD-010	0.81	0.08	0.01	0.03	PVTMFD-127	-0.79	0.62	-0.06	-0.15
PVTMFD-011	0.19	0.02	0.15	0.21	PVTMFD-128	-1.64	0.21	-0.06	-0.14
PVTMFD-012	-15.76	28.58	-0.07	-0.17	PVTMFD-129	-0.79	11.47	-0.06	-0.16
PVTMFD-013	0.38	0.05	0.02	0.04	PVTMFD-130	-1.48	0.26	-0.06	-0.14
PVTMFD-014	-2.16	-1.37	-0.07	-0.17	PVTMFD-131	0.70	0.13	0.01	0.03
PVTMFD-015	0.40	0.03	0.03	0.05	PVTMFD-132	-1.19	0.41	-0.04	-0.11
PVTMFD-016	-1.37	-0.14	-0.04	-0.13	PVTMFD-133	-1.50	-1.02	-0.05	-0.13
PVTMFD-017	0.26	-0.08	0.52	1.73	PVTMFD-134	0.20	-0.06	0.03	0.10
PVTMFD-018	0.23	-0.07	0.40	1.38	PVTMFD-135	0.20	-0.06	0.03	0.10
PVTMFD-019	0.23	-0.07	0.40	1.38	PVTMFD-136	0.26	-0.07	5.10	16.98
PVTMFD-020	0.23	-0.07	0.40	1.38	PVTMFD-137	0.26	-0.07	5.13	17.08
PVTMFD-021	0.23	-0.07	0.40	1.38	PVTMFD-138	0.26	-0.07	5.10	16.99
PVTMFD-022	0.23	-0.07	0.40	1.38	PVTMFD-139	0.26	-0.07	5.62	18.69
PVTMFD-023	0.26	-0.08	0.52	1.72	PVTMFD-140	0.26	-0.07	5.09	16.98
PVTMFD-024	0.26	-0.08	0.52	1.71	PVTMFD-141	0.26	-0.07	5.66	18.80
PVTMFD-025	0.26	-0.08	0.52	1.72	PVTMFD-142	0.26	-0.07	5.25	17.50

Schemes	SM	TM	JM	SoM	Schemes	SM	TM	JM	SoM
PVTMFD-026	0.26	-0.08	0.53	1.74	PVTMFD-143	-1.90	73.74	-0.05	-0.13
PVTMFD-027	0.23	-0.07	0.40	1.39	PVTMFD-144	0.26	-0.13	0.01	0.02
PVTMFD-028	0.23	-0.07	0.40	1.39	PVTMFD-145	-0.08	0.01	-0.04	-0.05
PVTMFD-029	0.23	-0.07	0.40	1.38	PVTMFD-146	0.30	-0.05	0.06	0.23
PVTMFD-030	0.26	-0.07	0.52	1.72	PVTMFD-147	0.30	-0.05	0.06	0.23
PVTMFD-031	0.23	-0.07	0.40	1.38	PVTMFD-148	0.81	0.08	0.01	0.03
PVTMFD-032	0.23	-0.07	0.40	1.38	PVTMFD-149	-3.41	-1.41	-0.06	-0.15
PVTMFD-033	0.26	-0.08	0.53	1.73	PVTMFD-150	0.94	0.08	0.02	0.03
PVTMFD-034	0.23	-0.07	0.40	1.38	PVTMFD-151	-10.64	4.80	-0.06	-0.16
PVTMFD-035	0.26	-0.07	0.53	1.74	PVTMFD-152	-14.97	3.03	-0.07	-0.17
PVTMFD-036	0.26	-0.08	0.53	1.74	PVTMFD-153	-3.60	0.98	-0.06	-0.16
PVTMFD-037	-6.64	1.61	-0.07	-0.17	PVTMFD-154	-0.15	-0.16	-0.01	-0.04
PVTMFD-038	0.29	-0.04	0.03	0.13	PVTMFD-155	0.34	0.02	0.02	0.04
PVTMFD-039	0.29	-0.04	0.03	0.13	PVTMFD-156	-4.07	-0.67	-0.07	-0.18
PVTMFD-040	0.23	-0.03	0.28	1.39	PVTMFD-157	-2.07	-0.62	-0.06	-0.15
PVTMFD-041	0.23	-0.03	0.28	1.39	PVTMFD-158	0.26	0.05	8.55	16.98
PVTMFD-042	0.26	-0.04	0.38	1.67	PVTMFD-159	0.26	0.05	6.23	12.39
PVTMFD-043	0.44	0.03	0.04	0.07	PVTMFD-160	0.26	0.05	8.55	16.98
PVTMFD-044	-0.57	-0.07	-0.03	-0.10	PVTMFD-161	0.26	0.05	8.56	17.01
PVTMFD-045	0.23	-0.03	0.28	1.39	PVTMFD-162	0.26	0.05	9.43	18.78
PVTMFD-046	0.26	-0.04	0.37	1.65	PVTMFD-163	-6.76	-0.45	-0.06	-0.16
PVTMFD-047	0.23	-0.03	0.28	1.39	PVTMFD-164	0.87	0.07	0.02	0.04
PVTMFD-048	0.23	-0.03	0.28	1.38	PVTMFD-165	-0.69	-0.05	-0.03	-0.10
PVTMFD-049	0.23	-0.03	0.26	1.31	PVTMFD-166	0.74	0.09	0.01	0.03
PVTMFD-050	0.23	-0.03	0.27	1.37	PVTMFD-167	0.23	0.04	0.01	0.02
PVTMFD-051	0.40	0.02	0.03	0.05	PVTMFD-168	-51.49	-6.97	-0.07	-0.18
PVTMFD-052	-1.42	-0.11	-0.05	-0.16	PVTMFD-169	-1.59	-0.66	-0.05	-0.12
PVTMFD-053	-1.54	-0.15	-0.05	-0.16	PSMFD-001	0.29	0.08	0.01	0.03
PVTMFD-054	0.61	0.04	0.02	0.03	PSMFD-002	-0.22	-0.03	-0.01	-0.04
PVTMFD-055	0.23	-0.03	0.28	1.38	PSMFD-003	0.26	-0.13	6.17	18.29
PVTMFD-056	0.26	-0.04	0.37	1.63	PSMFD-004	0.26	-0.13	5.72	16.98
PVTMFD-057	0.23	-0.03	0.28	1.39	PSMFD-005	0.26	-0.13	6.17	18.29
PVTMFD-058	0.23	-0.03	0.28	1.39	PSMFD-006	0.32	0.02	0.03	0.05
PVTMFD-059	0.74	0.06	0.02	0.05	PSMFD-007	0.32	0.02	0.03	0.05
PVTMFD-060	-2.66	-0.33	-0.06	-0.15	PSMFD-008	0.32	0.02	0.03	0.05
PVTMFD-061	-2.51	-0.28	-0.06	-0.15	PSMFD-009	-0.47	-0.03	-0.01	-0.05
PVTMFD-062	0.24	-0.03	0.03	0.20	PSMFD-010	0.26	0.18	7.82	18.66
PVTMFD-063	0.24	-0.03	0.03	0.20	PSMFD-011	0.26	0.18	7.79	18.59
PVTMFD-064	-1.47	-0.15	-0.05	-0.14	PSMFD-012	0.26	0.18	7.83	18.68
PVTMFD-065	0.39	0.02	0.03	0.05	PSMFD-013	0.26	0.18	7.83	18.68
PVTMFD-066	0.26	0.05	9.42	18.77	PSMFD-014	0.26	0.18	7.82	18.68
PVTMFD-067	0.72	0.09	0.01	0.03	PSMFD-015	0.26	-0.19	6.47	18.37
PVTMFD-068	-8.17	2.20	-0.06	-0.17	PSMFD-016	0.39	0.07	0.01	0.02
PVTMFD-069	0.02	0.00	0.01	0.00	PSMFD-017	-4.53	-1.99	-0.06	-0.16
PVTMFD-070	-2.08	-4.84	-0.07	-0.17	PSMFD-018	0.07	0.01	0.00	0.00

Schemes	SM	TM	JM	SoM	Schemes	SM	TM	JM	SoM
PVTMFD-071	-3.38	-6.05	-0.06	-0.16	PSMFD-019	-5.36	8.23	-0.06	-0.16
PVTMFD-072	-2.05	1.71	-0.06	-0.15	PSMFD-020	0.26	-0.04	3.79	17.19
PVTMFD-073	-4.63	-0.65	-0.06	-0.17	PSMFD-021	0.26	-0.33	6.43	17.57
PVTMFD-074	-4.19	-0.61	-0.06	-0.17	PSMFD-022	0.26	-0.04	3.98	17.93
PVTMFD-075	-0.03	-0.01	0.00	0.00	PSMFD-023	-0.37	-0.03	-0.01	-0.07
PVTMFD-076	0.28	0.02	0.03	0.04	PSMFD-024	0.00	0.00	0.01	0.00
PVTMFD-077	-2.12	-0.20	-0.06	-0.16	PSMFD-025	0.22	0.01	0.02	0.02
PVTMFD-078	-2.69	-0.28	-0.06	-0.17	PSMFD-026	-1.17	-0.13	-0.05	-0.14
PVTMFD-079	0.28	0.05	0.01	0.01	PSMFD-027	-0.03	0.01	-0.03	-0.02
PVTMFD-080	-42.90	-6.24	-0.07	-0.18	PSMFD-028	-0.37	-0.03	-0.01	-0.07
PVTMFD-081	-718.95	0.00	-0.07	-0.18	PSMFD-029	0.55	0.09	0.01	0.02
PVTMFD-082	-9.38	-5.33	-0.06	-0.16	PSMFD-030	0.03	0.00	0.01	0.00
PVTMFD-083	0.52	0.04	0.01	0.02	PSMFD-031	-1.14	-0.16	-0.04	-0.11
PVTMFD-084	-2.56	1.10	-0.06	-0.15	PSMFD-032	0.31	-0.04	0.08	0.32
PVTMFD-085	-15.92	10.13	-0.07	-0.18	PSMFD-033	0.17	-0.02	0.02	0.16
PVTMFD-086	0.71	0.08	0.01	0.02	PSMFD-034	-1.21	-1.53	-0.05	-0.14
PVTMFD-087	0.31	0.02	0.03	0.05	PSMFD-035	-0.07	-0.03	0.00	-0.01
PVTMFD-088	0.37	0.03	0.03	0.06	PSMFD-036	0.13	0.01	0.02	0.02
PVTMFD-089	-0.82	-0.07	-0.04	-0.13	PSMFD-037	-11.80	48.38	-0.07	-0.17
PVTMFD-090	0.70	0.09	0.01	0.03	PSMFD-038	0.26	-0.04	3.82	17.26
PVTMFD-091	-6.74	-0.94	-0.06	-0.15	PSMFD-039	-0.05	0.01	-0.01	-0.01
PVTMFD-092	0.47	0.06	0.01	0.01	PSMFD-040	-1.77	0.78	-0.04	-0.10
PVTMFD-093	-6.94	-1.01	-0.06	-0.15	PSMFD-041	0.22	0.01	0.03	0.03
PVTMFD-094	-0.55	-0.05	-0.03	-0.11	PSMFD-042	-0.83	-0.07	-0.03	-0.10
PVTMFD-095	-1.02	-0.28	-0.04	-0.11	PSMFD-043	-0.85	-0.07	-0.03	-0.09
PVTMFD-096	-1.16	-0.11	-0.04	-0.12	PSMFD-044	-0.90	-0.07	-0.03	-0.10
PVTMFD-097	-0.44	-0.03	-0.02	-0.09	PSMFD-045	-0.81	-0.06	-0.03	-0.09
PVTMFD-098	0.27	-0.08	0.54	1.75	PSMFD-046	0.21	0.01	0.03	0.03
PVTMFD-099	0.97	0.09	0.03	0.06	PSMFD-047	-0.83	-0.07	-0.03	-0.09
PVTMFD-100	-1.43	-0.17	-0.06	-0.16	PSMFD-048	-1.20	-0.12	-0.04	-0.11
PVTMFD-101	0.30	0.02	0.03	0.04	PSMFD-049	0.18	0.01	0.01	0.02
PVTMFD-102	-1.37	-0.14	-0.04	-0.13	PSMFD-050	0.17	0.01	0.01	0.02
PVTMFD-103	0.05	0.00	0.01	0.00	PSMFD-051	0.31	0.07	0.02	0.04
PVTMFD-104	0.06	0.00	0.01	0.01	PSMFD-052	-1.06	-0.60	-0.04	-0.11
PVTMFD-105	-1.67	-0.14	-0.04	-0.12	PSMFD-053	0.26	-0.07	5.65	18.74
PVTMFD-106	0.26	-0.03	3.50	18.83	PSMFD-054	0.26	-0.07	5.10	16.97
PVTMFD-107	-6.29	-1.05	-0.07	-0.18	PSMFD-055	-0.37	0.13	-0.03	-0.07
PVTMFD-108	0.19	0.04	0.01	0.01	PSMFD-056	0.22	-0.08	0.01	0.04
PVTMFD-109	-14.47	-3.04	-0.07	-0.17	PSMFD-057	-0.56	0.14	-0.04	-0.10
PVTMFD-110	0.22	0.01	0.02	0.02	PSMFD-058	-0.55	0.10	-0.05	-0.10
PVTMFD-111	-1.04	-0.10	-0.05	-0.15	PSMFD-059	0.26	-0.07	5.65	18.74
PVTMFD-112	-0.25	-0.03	-0.01	-0.07	PSMFD-060	0.26	-0.07	5.10	16.97
PVTMFD-113	-0.01	0.00	0.01	0.00	PSMFD-061	-0.78	-0.11	-0.04	-0.12
PVTMFD-114	-1.02	-0.09	-0.04	-0.14	PSMFD-062	0.26	0.05	8.55	16.98
PVTMFD-115	-1.09	-0.09	-0.04	-0.14	PSMFD-063	0.26	0.05	9.40	18.73
PVTMFD-116	0.00	0.00	-0.07	-0.18	PSMFD-064	0.19	-0.18	0.00	0.01
PVTMFD-117	0.00	0.00	-0.07	-0.18	PSMFD-065	-4.58	7.27	-0.06	-0.16

Source: Computed performance measures of private and public sector mutual funds Debt schemes.

Note 1: First and sixth column indicates the codes (For private sector schemes coded as PVTMFD-001to PVTMFD -169 and for public sector schemes coded as PSMFD-001 to PSMFD-065).

Note 2: Second and seventh column indicates Sharpe measure (SM) of schemes.

Note 3: Third and eighth column indicates Treynor measure (TM) of schemes.

Note 4: Fourth and ninth column indicates Jensen measure (JM) of schemes.

Note 5: Fifth and tenth column indicates Sortino measure (SoM) of schemes for the study period.

Table 5 Tests of Normality of Private and Public Sector Mutual Fund Debt Schemes.

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SM	.454	234	**.000**	.067	234	**.000**
TM	.422	234	**.000**	.183	234	**.000**
JM	.430	234	**.000**	.516	234	**.000**
SoM	.416	234	**.000**	.515	234	**.000**

Table 6 Mann-Whitney Test of Private and Public Sector Mutual Fund Debt Schemes.

Test Statistics[a]				
	SM	TM	JM	SoM
Mann-Whitney U	5311.000	4930.000	4779.000	4714.000
Wilcoxon W	19676.000	19295.000	19144.000	19079.000
Z	-.391	-1.213	-1.538	-1.678
Asymp. Sig. (2-tailed)	**.696**	**.225**	**.124**	**.093**

Table 7 Comparison of mutual fund return and Benchmark Return of Private and Public Sector Mutual Fund Debt Schemes:

	PVTMFD	PUBMFD
Above Average Benchmark	99 (59%)	38 (58%)
Below Average Benchmark	70 (41%)	27 (42%)
Total schemes	**169**	**65**

Table 8 Chi square test of Private and Public sector Mutual Fund Debt Schemes.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.000	1	**.987**		
Continuity Correction	.000	1	1.000		
Likelihood Ratio	.000	1	.987		
Fisher's Exact Test				1.000	.551
N of Valid Cases	234				