

## **Performance of Equity Schemes during Different Phases of Business Cycle in India**

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**Abstract:** *This is of paramount importance for investors, policy makers, governing bodies, mutual fund companies to analyze whether Indian mutual fund schemes have been performing efficiently. The present study evaluated the performance of mutual funds sector wise in India over a period of last 11 years (2003 to 2014) using number of performance indicators and extensive dataset. The analysis consists of 18 Equity schemes of public, private and foreign sector mutual fund companies. The entire study period is classified into three sub-periods based on movement of SENSEX and these are named as pre-period, inter- period and post-period. Effect of different economic situations during this time period with reference to selected mutual fund schemes of public, private and foreign sectors has been studied on the basis of risk and return parameters. The analysis has been made by using General Linear Model and Post Hoc Test on the basis of beta, coefficient of determination, Sharpe ratio, Treynor's ratio and Jensen's ratio with respective time periods and sectors. The study evidenced that foreign sector performed well as compared to public and private sector in pre and post period. During recession public, private and foreign sector AMC's move according to market against the expectations of investors.*

**Keywords:** *Mutual Fund, AMCs, Sharpe Ratio, Treynor's Ratio, Jensen Alpha*

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### **I. Introduction**

Mutual Funds is the most suitable investment for the common men as it offers an opportunity to invest in a diversified, professionally managed basket of securities at a relatively low cost. Indian mutual fund industry consists of various portfolio mix, expertise of professional management and various investment objectives. The present study is to evaluate the performance of selected mutual fund equity schemes during different phases of business cycle in India in last 11 years 2003 to 2014. The growth and performance of mutual funds has become more complex in context to accommodate both return and risk measurement [Vijaylaxmi Sunder, 2014]. The present study made an attempt to evaluate the performance of selected equity schemes by differentiating them into public, private and foreign sectors.

### **II. Review of Literature**

Number of research studies had been conducted by various researchers on mutual funds. However, some of the relevant and important studies have been reviewed. This study examines important aspects related to mutual funds.

Ghosh and Roy (2013) in their research paper "Can Mutual Fund Predict the Future? An Empirical Study" seeks to examine the NAV performance of the selected open-ended mutual fund schemes in India. With a view to examine the consistency in return performance of the selected mutual fund schemes, auto-regressive model is applied and observed that only 34 schemes out of 56 open-ended income schemes have consistently influenced the return performance.

Giamouridis and Sakellariou (2012) in their research paper "Short Term Persistence in Greek Mutual Fund Performance" investigate the performance of Greek mutual funds. Analysis shows that mutual fund performance does not persist over short term horizons of any kind i.e. bi-monthly or quarterly.

Hei, Huij and Lansdorp (2012) in their research on the topic "Mutual Fund Performance Persistence, Market Efficiency, and Breadth" study performance persistence across different styles, regions and asset classes. Our results are inconsistent with anecdotal evidence that the added value of active management is concentrated in less efficient markets. Instead, our results indicate that managerial skill is more pronounced in markets that offer more investment opportunities.

Ferson and Haight (2012) in their research paper on topic "Performance Measurement with Market Volatility: Timing and Selectivity" examines the performance measurement of selected mutual funds. The investment performance of a portfolio manager who may engage in market timing behaviour depends on market

level and timing as well as security selection. This study indicates versions of the new model that focus on asset allocation consistent with previous studies, finding weak negative market. .

Guercio and Jonathan (2010) in their research paper “Mutual Fund Performance and the Incentives to Generate Alpha” demonstrated that retail mutual fund market is more accurately described as a segmented market catering to two distinct types of investors. In contrast, research shows that actively managed funds sold through brokers face a weaker incentive to generate alpha, and significantly underperform index funds. These findings underscore the need for mutual fund researchers to take mutual fund incentives into account when studying mutual fund performance.

### **III. Research Methodology**

**Time Period of the Study**-Time period taken for the study is 1<sup>st</sup> April 2003 to 31<sup>st</sup> March 2014. During this tenure different phases of Trade Cycle like Pre (boom), Inter (recession) and Post (recovery) affects the performance of Indian mutual funds.

**Objectives of the Study**- Main objective of the study is to evaluate the performance of equity mutual fund schemes sector wise (Asset Management Companies) in India. Also Asset Management Companies performance in terms of Public, Private and Foreign players has been calculated for different phases of trade cycle in the time period from 2003 to 2014. Time period selected for study was very different & results will actually reveal the performance of Mutual Funds in India. Main objective of the study is as given below  
To evaluate the performance of selected equity mutual fund schemes of public, private and foreign sector during different phases of trade cycle in India in last eleven years.

**Universe and Sample** - On 31<sup>st</sup> March, 2014 there are 46 Asset Management Companies existing at present with total assets under management of Rs. 905120 crore. There were 8 Public sector including UTI, 27 Private sector and 11 foreign sector Asset Management Companies. 4 public sector, 9 private sector and 5 foreign sector companies were taken as sample to conduct research.

**Data Collection:** This study is entirely based on the secondary data. Secondary data is mainly taken from the AMFI website. NAVs for the given time duration was mainly taken from AMFI website supplemented by Economic Times. Annual NAVs (Net Asset Values) for 18 selected schemes for time period of 11 years has been collected and respective benchmarks of all the selected schemes have been taken for calculation. Also data for respective benchmarks of all selected mutual fund schemes for same period was collected.

**Data Analysis** - Depending upon the objectives of the study SPSS General Linear Model and Post Hoc Test along with various financial tools used are Beta, Risk adjusted performance measures like Sharpe Measure, Treynor's Measure, Jensen's Measure and Coefficient of Determination were used.

#### **General Linear Model (GLM)**

General Linear Model is used for difference in performance indicators by business Cycle (depicted by time period). SPSS General Linear Model testing procedure is more useful when research analysis includes both numeric (interval level) and categorical variable (nominal level). When the research problem includes a specific comparisons there is need to select the reference groups that make this comparison possible.

#### **Turkey's Post Hoc Test**

Turkey's Post Hoc Test is used to depict multiple comparisons between respective time periods linked to private, public and foreign sectors. This test control against committing type I error at the designated level in the absence of a significant overall result. To make all possible pair- wise comparisons of time period variables pre, inter and post with respect of mutual fund sectors public, private and foreign.

**Systematic Risk** –Beta ( $\beta$ ) measures the risk or volatility of mutual fund scheme relative to market portfolio. Beta reflects the systematic risk which cannot be reduced. The CAPM describes the relationship between risk and expected return and used for pricing risky securities

$$R_{PT} = \alpha_p + \beta_p R_{mt} + \epsilon_p$$

$R_{PT}$  - Return of M.F Schemes for time period       $R_{mt}$  - Return on Market index for time period

$\alpha_p$  - Intercept Term,  $\epsilon_p$  - Error term       $\beta_p$  - Measure of Sensitivity

**Risk Adjusted Performance Measure**-The reward to variability ratio attempted by Sharpe is known as Sharpe ratio.

This measure of performance should properly adjust the risk involved. Sharpe index measures risk premium of the portfolio.

$$S_p = (R_p - R_f) / \sigma_p$$

Where  $R_p$  – Avg. Return on portfolio,  $\sigma_p$  – Total Risk or S.D  
 $R_f$  – Average risk free rate of return (91 days Treasury bills)

**For Sharpe Ratio Benchmark** - The benchmark for comparison of performance with Sharpe index is  
 $= (R_m - R_f) / \sigma_m$

Where  $R_m$  – Avg. Risk of Market  $\sigma_m$  – Total Risk of Market

**1. Treynor's Ratio (1965)** - Treynor's has developed a measure based on the systematic risk. Relationship between funds additional return over risk free return wherein market risk is ( $\beta$ ). Also called reward to volatility measure

$$T_p = (R_p - R_f) / \beta_p$$

$R_p$  – Avg. Return on Portfolio  $\beta_p$  – Sensitivity of fund return to market  
 $R_f$  – Avg. risk free return (91-days treasury bill)

**Jensen's Alpha or Jensen's Performance Index** - This is risk adjusted measure that takes into account the relative riskiness of the portfolio. Portfolio is having positive alpha or abnormal returns if it is having higher returns than the risk adjusted returns. This measure represents the average return of portfolio over and above as predicted by Capital Asset Pricing Model.

Jenson ( $\alpha$ ) is given as

$$\alpha_p = R_p - [R_f + \beta_p (R_m - R_f)]$$

$R_p$  - Avg. return of the portfolio  $R_f$  - Avg. return of the risk free proxy  
 $R_m$  - Avg. return of benchmark proxy  $\beta_p$  - Beta of the portfolio

Jensen Alpha represents the difference between average return and equilibrium average return of the portfolio. Positive value of alpha means that portfolio has performed better and the manager is able to produce better returns greater than the expected for the certain level of risk.

**Coefficient of Determination ( $R^2$ )** - Coefficient of determination is the square of the correlation co-efficient and indicates the degree of diversification. Low coefficient of determination ( $R^2$ ) indicates that scheme has further scope for diversification and high coefficient of determination ( $R^2$ ) indicates that scheme is well diversified. R-squared measures the relationship between a portfolio and its benchmark.

**Data Analysis and Interpretations**

In this study consolidated figures of public, private and foreign sector mutual fund schemes for different time period's pre, inter and post were used for calculating various performance indicators.

**Paired T-Test** - Paired t-test is used for identifying mean differences for equity schemes for all performance indicators related to risk and returns in three time-periods i.e. pre, inter and post. The paired t-test is used to compare how different sectors public, private and foreign perform during varying test conditions (time periods) pre, inter and post. The paired t-test calculates differences within each before and after pair of measurements, determines the mean of these changes, and reports whether this mean of the differences is statistically significant at 95% level of significance. Three combinations of time are used PRE-INTER, INTER-POST and PRE-POST to reveal the performance of public, private and foreign sector AMCs.

**Table-1**Equity schemes beta t-values (differences) during pre, intermediate and post periods

Time-Period	Private sector t-values	Public sector t-values	Foreign sector t-values
PRE – INTER	1.235	-0.950	.304
<b>significance</b>	<b>0.0252</b>	0.140	.771
INTER – POST	-10.540	-2.628	-5.884
<b>significance</b>	0.140	0.058	<b>.001</b>
PRE – POST	7.987	-4.430	-2.816
<b>significance</b>	<b>0.000</b>	<b>0.011</b>	<b>.031</b>

Calculated at 95% level of significance

As seen in table -1 amongst private sector AMCs, it is observed that beta showed significant change in pre-inter and pre-post. Beta values for these time periods are less which meant lower portfolio risk for this scheme than for inter-post period. Whereas in public sector AMCs in the pre and post time period the change is significant. Beta value decreases which meant that there is least portfolio risk in public sector equity schemes. Rest of the time periods were insignificant which explained that beta values are high so more risky. In case of foreign sector AMCs Equity Schemes played a significant impact in inter-post and pre-post periods. But public sector schemes values are lesser which depicts that overall public sector schemes are less risky.

**Table – 2 Equity schemes COD (diversification) t-values during different time periods**

Time periods	Private sector t-values	Public sector t-value	Foreign sector t-values
PRE - INTER	5.036	-3.486	-4.963
<b>significance</b>	<b>0.001</b>	<b>0.025</b>	<b>.003</b>
INTER - POST	31.302	7.728	34.818
<b>significance</b>	<b>0.000</b>	<b>0.002</b>	<b>.000</b>
PRE - POST	5.979	1.162	3.405
<b>significance</b>	<b>0.000</b>	0.310	<b>.014</b>

Calculated at 95% level of significance

Higher value of coefficient of determination meant higher diversification of scheme portfolios that contain market variability factor. Mutual fund schemes are significant means higher returns. It can be concluded that adequate diversification is related to above market return situation. Private sector AMC's Equity Schemes showed positive significant change in all selected time periods. Increasing  $R^2$  meant that there is higher diversification of equity schemes that are helping to create market variability. Whereas in public sector AMC's Equity Schemes are showing higher coefficient of determination and significant change in pre-inter and inter-post. But during pre-post the market variability is non-significant. In foreign sector AMC's coefficient of determination increased during these respective time period. There were all significant changes being observed in all time period (pre-post, pre-inter and inter-post).

**Table-3 Equity schemes Sharpe Ratio t- values differences during the given periods**

Time Period	Private sector t-values	Public sector t-values	Foreign sector t-values
PRE – INTER(S)	7.991	0.386	11.580
<b>significance</b>	<b>0.000</b>	0.348	<b>.000</b>
INTER – POST(S)	-5.380	5.725	-5.352
<b>significance</b>	0.214	0.411	.204
PRE – POST(S)	8.049	0.440	10.269
<b>significance</b>	<b>0.000</b>	0.355	<b>.000</b>
PRE – INTER(M)	10.042	11.727	65.560
<b>significance</b>	<b>0.000</b>	0.328	<b>.000</b>
INTER – POST(M)	-6.490	0.981	5.766
<b>significance</b>	0.143	0.088	.104
PRE – POST(M)	17.989	1.856	18.366
<b>significance</b>	<b>0.000</b>	0.099	<b>.000</b>

Calculated at 95% level of significance

Higher positive value meant higher is existence of adequate returns as against the risk involved. In private sector AMC's Sharpe Ratio has increased significantly in pre-inter and pre-post period. But it has decreased significantly during the recession i.e. inter-post period. So equity schemes have rewarded well on their investment. These equity schemes have outperformed the market index in pre-post and pre-inter.

In public sector AMC's Sharpe Ratio has increased but not significantly in pre-inter and pre-post period. But the value was quite low in inter-post period. This meant equity schemes showed adequate returns but not give excessive rewards. Whereas in foreign sector AMC's Sharpe Ratio for equity schemes has increased and gave excessive returns over risk free returns per unit of standard deviation. These equity schemes had outperformed in pre-inter and pre-post significantly.

**Table-4 Treynor's Ratio t- values for Equity schemes during given time periods**

Time-Period	Private sector t-values	Public sector t-values	Foreign sector t-values
PRE – INTER(S)	0.632	1.600	.813
<b>significance</b>	<b>0.020</b>	0.975	.447
INTER – POST(S)	0.676	0.320	.061
<b>significance</b>	0.518	0.410	.953
PRE – POST(S)	0.263	0.120	.886
<b>significance</b>	<b>0.040</b>	0.788	.410
PRE – INTER(M)	-0.043	0.326	0.014
<b>significance</b>	0.967	0.318	.213
INTER – POST(M)	-4.825	0.374	-.973
<b>significance</b>	<b>0.001</b>	0.410	.368
PRE – POST(M)	-0.894	0.669	1.321
<b>significance</b>	0.397	0.339	.235

Calculated at 95% level of significance

Treynor's ratio measures excess returns earned over risk free return per unit of systematic risk i.e. beta. As depicted in table 4 amongst private sector AMC's Equity Schemes have showed significant effect in only pre-post period. This attained lower value as the risk attached is higher in private sector returns.

While for public sector AMC's Equity Schemes Treynor's ratio is higher but altogether insignificant. It is positive means that per unit risk attached is less than private and foreign sector AMC's. In foreign sector AMC's Treynor's value is insignificant in all the funds. The change is least in between the time period. The change is highly insignificant in inter- post period due to effects of recession

**Table-5 Jensen's alpha t- values for Equity schemes during given time period**

Time - Periods	Private sector t-values	Public sector t-values	Foreign sector t-values
PRE – INTER	4.958	0.116	0.546
<b>significance</b>	<b>0.001</b>	0.149	<b>.002</b>
INTER – POST	-10.825	0.217	-7.199
<b>significance</b>	<b>0.000</b>	0.245	<b>.000</b>
PRE – POST	5.430	-0.410	1.633
<b>significance</b>	<b>0.001</b>	0.016	.154

In case of private sector AMC's equity schemes have well attained excess returns of the schemes with excess return of the market. High and significant value of alpha is observed for pre-inter and pre-post period. But it is significantly less than in the intermediate period. While in public sector AMC's the change is insignificant amongst the time period. But high alpha values indicate better performance in equity schemes. Positive t-value is generated for three respective time periods. In foreign sector AMC's the significant positive change is observed in pre-inter period and significant change observed in inter-post period. Overall the equity schemes change in foreign sector is insignificant across all the given time periods pre, post and foreign sector.

**Table-6 F-Statistics for Performance and Period**

Source	Type III Sum of Squares	Degrees of freedom	Mean Square	F	Significance
Corrected Model	692103.361 <sup>a</sup>	98	7062.279	2.094	.000
Intercept	143575.989	1	143575.9	42.577	.000
Performance	174661.523	11	15878.32	4.709	.000
Period	99387.850	8	12423.48	3.684	.000
Performance * Period	376925.664	79	4771.211	1.415	.015
Error	2003036.653	594	3372.116		
Total	2836219.413	693			
Corrected Total	2695140.015	692			

R Squared = .257 (Adjusted R Squared = .134)

**Testing the multiple comparison between the factors (Equity)**

The GLM procedure for equity schemes is generated to develop the model between dependent scale (NAV values) based on relationship to scale the predictors (performance indicators and time span divided into pre-intermediate and post effects). The table demonstrates between subject factor information. It depicts that equity performance indicators are significant at one percent with f-value (4.709) and period wise business cycle are even significant at one percent with f-value (3.684), even it is observed that there are interaction effects between performance and periods significant at 5 percent with f -value (1.415). Approximately 25.7 percent of variation is observed in performance with respect to movement in time periods. The overall model was tested for its ability to account for variation in values.

**Table -7 Performance \* Period Dependent Variable: Values**

PERFORMANCE		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Beta	Inter-private	-.507	19.357	-38.522	37.509
	Inter-foreign	-.497	21.948	-43.603	42.609
	Inter- public	-.170	25.970	-51.173	50.834
	Post-foreign	.681	21.948	-42.425	43.787
	Post-private	.784	19.357	-37.232	38.800
	Post-public	.605	25.970	-50.399	51.608
	Pre-foreign	-.430	21.948	-43.536	42.676
	Pre-private	-.704	19.357	-38.720	37.312
Pre-public	-.120	25.970	-51.123	50.884	

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Jensen's Alpha	Inter-private	-0.197	0.194	-57.721	18.310
	Inter-foreign	-0.110	0.237	-57.530	35.589
	Inter-public	-.003	0.260	-51.281	50.726
	Post-foreign	0.133	0.237	-33.239	59.880
	Post-private	0.141	0.194	-23.872	52.159
	Post-public	0.075	0.260	-43.488	58.519
	Pre-foreign	0.305	0.237	-16.072	77.048
	Pre-private	0.331	0.194	-4.867	71.164
Market Return Excess	Inter-private	12.220	19.357	-25.796	50.236
	Inter-foreign	8.026	21.948	-35.080	51.132
	Inter-public	14.437	25.970	-36.566	65.441
	Post-foreign	-3.794	21.948	-46.899	39.312
	Post-private	-5.666	19.357	-43.682	32.350
	Post-public	-4.145	25.970	-55.149	46.859
	Pre-foreign	55.768	21.948	12.662	98.874
	Pre-private	42.496	19.357	4.480	80.511
Market Standard Deviation	Inter-private	19.443	25.970	-31.560	70.447
	Inter-foreign	65.646	19.357	27.631	103.662
	Inter-public	73.377	21.948	30.271	116.483
	Post-foreign	66.756	25.970	15.753	117.760
	Post-private	11.712	21.948	-31.394	54.817
	Post-public	13.981	19.357	-24.034	51.997
	Pre-foreign	17.223	25.970	-33.781	68.226
	Pre-private	62.545	21.948	19.439	105.651
R-Square	Pre-public	44.135	19.357	6.120	82.151
	Pre-public	45.655	25.970	-5.349	96.658
	Inter-private	.83	19.357	-37.016	39.016
	Inter-foreign	.78	21.948	-42.106	44.106
	Inter-public	.87	25.970	-50.004	52.004
	Post-foreign	.066	21.948	-43.039	43.172
	Post-private	.099	19.357	-37.917	38.114
	Post-public	.233	25.970	-50.770	51.237
Scheme Return Excess	Pre-foreign	.425	21.948	-42.681	43.531
	Pre-private	.525	19.357	-37.491	38.541
	Pre-public	.600	25.970	-50.403	51.604
	Inter-private	-12.19	19.357	-50.207	25.824
	Inter-foreign	-10.33	21.948	-53.442	32.770
	Inter-public	3.144	25.970	-47.860	54.147
	Post-foreign	11.675	21.948	-31.431	54.780
	Post-private	16.281	19.357	-21.735	54.297
Standard Deviation Scheme	Post-public	7.297	25.970	-43.707	58.300
	Pre-foreign	45.249	21.948	2.143	88.355
	Pre-private	53.803	19.357	15.787	91.819
	Pre-public	33.376	25.970	-17.627	84.380
	Inter-private	29.573	19.357	-8.443	67.589
	Inter-foreign	31.852	21.948	-11.253	74.958
	Inter-public	25.845	25.970	-25.159	76.848
	Post-foreign	35.154	21.948	-7.952	78.260
Sharpe Ratio Market	Post-private	39.649	19.357	1.634	77.665
	Post-public	26.343	25.970	-24.661	77.347
	Pre-foreign	46.648	21.948	3.542	89.754
	Pre-private	46.880	19.357	8.865	84.896
	Pre-public	30.845	25.970	-20.159	81.848
	Inter-private	-.197	19.357	-37.819	38.213
	Inter-foreign	-.132	21.948	-42.974	43.238
	Inter-public	.219	25.970	-50.785	51.222
Sharpe Ratio	Post-foreign	.277	21.948	-43.383	42.828
	Post-private	.325	19.357	-38.341	37.691
	Post-public	.220	25.970	-51.223	50.784
	Pre-foreign	.944	21.948	-42.161	44.050
	Pre-private	.998	19.357	-37.017	39.014
	Pre-public	.588	25.970	-50.416	51.591
	Inter-private	-.526	19.357	-38.542	37.490
	Inter-foreign	-.366	21.948	-43.472	42.740
Sharpe Ratio	Inter-public	1.591	25.970	-49.413	52.594
	Post-foreign	.325	21.948	-42.781	43.431
	Post-private	.404	19.357	-37.612	38.420
	Post-public	.170	25.970	-50.833	51.174
	Pre-foreign	.972	21.948	-42.134	44.078
	Pre-private				

	Pre-private	1.196	19.357	-36.819	39.212
	Pre-public	12.278	25.970	-38.726	63.281
Treyhors Ratio	Inter-private	. <sup>a</sup>			
	Inter-foreign	-0.165	0.205	-0.568	0.238
	Inter-public	. <sup>a</sup>			
	Post-foreign	0.076	0.205	-0.480	0.327
	Post-private	. <sup>a</sup>			
	Post-public	. <sup>a</sup>			
	Pre-foreign	1.816	0.205	1.413	2.219
	Pre-private		0	0	0
	Pre-public		0	0	0
Treyhor's Market Index	Inter-private	-0.277	0.194	-0.658	0.103
	Inter-foreign		0	0	0
	Inter-public	-0.019	0.260	-0.529	0.491
	Post-foreign		0	0	0
	Post-private	-0.076	0.194	-0.456	0.304
	Post-public	0.951	0.260	-1.461	-0.441
	Pre-foreign		0	0	0
	Pre-private	-0.286	0.194	-0.666	0.094
	Pre-public	0.931	0.260	0.421	1.441
Treyhor's Ratio	Inter-private	0.321	0.194	-0.059	0.701
	Inter-foreign	0.258	0.219	-0.174	0.689
	Inter-public	0.107	0.260	-0.404	0.617
	Post-foreign	0.249	0.219	-0.182	0.680
	Post-private	0.241	0.194	-0.139	0.621
	Post-public	0.266	0.260	-0.244	0.776
	Pre-foreign	0.860	0.219	0.429	1.291
	Pre-private	-0.433	0.194	-0.813	-0.052
	Pre-public	0.126	0.260	-0.384	0.636
a. This level combination of factors is not observed, thus the corresponding population marginal mean is not estimable.					

### General Linear Model (GLM)

GLM model for difference in performance indicators by business cycle

**Tests of Between-Subjects Effects-** Dependent Variable: VALUES Descriptive table displayed Statistics for each combination of factors (PERFORMANCE\*PERIODS) in the model as described below Standard Deviation-The standard deviation appears to be relatively homogenous across all time periods. Beta-Mean small differences in group standard deviation are due to random variations. Beta ( $\beta$ ): i.e., funds volatility as regard market index measuring the extent of co-movement of fund with that of the benchmark index. Beta values of higher than unity imply higher portfolio risk for the schemes than the market portfolio, and vice-versa. On an average no beta value of equity schemes is greater than unity; hence it can be assumed that performance of beta in between the time periods is not risky. As documented by R. Narayansamy and V. Rathnamani [2013] for post period.

Co-efficient of Determination ( $R^2$ ) is a Statistics that give information about the goodness of fit of a model. Values of  $R^2$  outside the range 0 to 1 can occur where it is used to measure the agreement between observed and modelled values.  $R^2$  is given directly in terms of the explained variance (variance of the model's predictions) with the total variance (of the data). High value of  $R^2$  shows higher diversification of the schemes portfolio that can easily contain the market variability. So, higher value of  $R^2$  was observed for pre and intermediate period and low values for post period. Value of  $R^2$  is evident from the study conducted by R. Narayansamy and V. Rathnamani [2013] for post period.

Sharpe Ratio- is an excess returns earned over risk-free return ( $R_f$ ) per unit of risk i.e., per unit of standard deviation. Higher positive values of Sharpe ratio is observed during all time periods except inter-foreign and inter-private time periods.

Treyhor's Ratio- measures the excess returns earned over risk i.e., beta. On an average all time periods reveals that inter-private and inter-foreign are more risky due to higher value of beta. It is evident from the study conducted by R. Narayansamy and V. Rathnamani [2013] for post period and M.V. Subha and Jaya Bharathi for pre period. Jensen's Alpha- is the regression of excess returns of the scheme (dependent variable) with excess return of the market (independent variable). Higher alpha values are predicted during pre and post periods in all three sectors public, private and foreign. Lower values are observed during inter- time period in all three sectors. This value of Jensen Alpha is not consistent with the study conducted by Abhijit Kundu [2009] for pre period.

### Turkey's Post Hoc Test

Turkey's Post Hoc Test is used to depict multiple comparisons between respective time periods linked to private, public and foreign sectors. This test control against committing type I error at the designated level in the absence of a significant overall result. To make all possible pair- wise comparisons of time period variables pre, inter and post with respect of mutual fund sectors public, private and foreign

**Table -8** Dependent Variable Values of Turkey's HSD

(I) PERIOD	(J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Inter Private	Inter-private	-1.8736	8.82358	1.00	-29.3437	25.596
	Inter-public	-3.7479	9.76591	1.00	-34.1517	26.655
	Post-foreign	-.2799	8.82358	1.00	-27.7500	27.190
	Post-private	-1.4375	8.25370	1.00	-27.1334	24.258
	Post-public	8.5084	9.76591	.994	-21.8954	38.912
	Pre-foreign	<b>41.0655*</b>	8.82358	.000	-68.5356	-13.594
	Pre-private	-6.4103	8.25370	.997	-32.1062	19.285
	Pre-public	-18.1826	9.76591	.640	-48.5864	12.221
Inter Foreign	Inter-private	1.8736	8.82358	1.00	-25.5965	29.343
	Inter-public	-1.8743	10.2520	1.00	-33.7916	30.043
	Post-foreign	1.5937	9.35881	1.00	-27.5428	30.730
	Post-private	.4361	8.82358	1.00	-27.0340	27.906
	Post-public	10.3820	10.2520	.985	-21.5354	42.299
	Pre-foreign	<b>39.1919*</b>	9.35881	.001	-68.3283	-10.055
	Pre-private	-4.5367	8.82358	1.00	-32.0068	22.933
	Pre-public	-16.3090	10.2520	.810	-48.2263	15.608
Inter Public	Inter-private	3.7479	9.76591	1.00	-26.6559	34.151
	Inter-foreign	1.8743	10.2520	1.00	-30.0431	33.791
	Post-foreign	3.4680	10.2520	1.00	-28.449	35.385
	Post-private	2.3104	9.76591	1.00	-28.093	32.714
	Post-public	12.2563	11.0735	.973	-22.2184	46.731
	Pre-foreign	<b>-37.3176*</b>	10.2520	.009	-69.2350	-5.4002
	Pre-private	-2.6624	9.76591	1.00	-33.0662	27.741
	Pre-public	-14.4347	11.0735	.930	-48.9094	20.040
Post Foreign	Inter-private	.2799	8.82358	1.00	-27.1902	27.750
	Inter-foreign	-1.5937	9.35881	1.00	-30.7301	27.542
	Inter-public	-3.4680	10.2520	1.00	-35.3853	28.449
	Post-private	-1.1575	8.82358	1.00	-28.6276	26.312
	Post-public	8.7883	10.2520	.995	-23.1290	40.705
	Pre-foreign	<b>-40.7855*</b>	9.35881	.001	-69.9220	-11.649
	Pre-private	-6.1303	8.82358	.999	-33.6004	21.339
	Pre-public	-17.9027	10.2520	.717	-49.8200	14.014
Post Private	Inter-private	1.4375	8.25370	1.00	-24.2584	27.133
	Inter-foreign	-.4361	8.82358	1.00	-27.9062	27.034
	Inter-public	-2.3104	9.76591	1.00	-32.7142	28.093
	Post-foreign	1.1575	8.82358	1.00	-26.3126	28.627
	Post-public	9.9459	9.76591	.984	-20.4580	40.349
	Pre-foreign	<b>39.6280*</b>	8.82358	.000	-67.0981	-12.157
	Pre-private	-4.9728	8.25370	1.00	-30.6687	20.723
	Pre-public	-16.7451	9.76591	.737	-47.1489	13.658
Post Public	Inter-private	-8.5084	9.76591	.994	-38.9122	21.895
	Inter-foreign	-10.382	10.2520	.985	-42.2994	21.535
	Inter-public	-12.256	11.0735	.973	-46.7310	22.218
	Post-foreign	-8.788	10.2520	.995	-40.7057	23.129
	Post-private	-9.945	9.76591	.984	-40.3497	20.458
	Pre-foreign	<b>-49.5739*</b>	10.2520	.000	-81.4912	-17.656
	Pre-private	-14.9187	9.76591	.842	-45.3225	15.485
	Pre-public	-26.6910	11.0735	.280	-61.1657	7.7837
Pre Foreign	Inter-private	<b>41.0655*</b>	8.82358	.000	13.5954	68.535
	Inter-foreign	<b>39.1919*</b>	9.35881	.001	10.0554	68.328
	Inter-public	<b>37.3176*</b>	10.2520	.009	5.4002	69.235
	Post-foreign	<b>40.7855*</b>	9.35881	.001	11.6491	69.922
	Post-private	<b>39.6280*</b>	8.82358	.000	12.1579	67.098
	Post-public	<b>49.5739*</b>	10.2520	.000	17.6565	81.491
	Pre-private	<b>34.6552*</b>	8.82358	.003	7.1851	62.125
	Pre-public	22.8829	10.2520	.386	-9.0345	54.800
Pre Private	Inter-private	6.4103	8.25370	.997	-19.2857	32.106
	Inter-foreign	4.5367	8.82358	1.00	-22.9334	32.006
	Inter-public	2.6624	9.76591	1.00	-27.7414	33.066
	Post-foreign	6.1303	8.82358	.999	-21.3398	33.600
	Post-private	4.9728	8.25370	1.00	-20.7231	30.668



	Post-public	14.9187	9.76591	.842	-15.4852	45.322
	Pre-foreign	<b>-34.6552*</b>	8.82358	.003	-62.1253	-7.1851
	Pre-public	-11.7723	9.76591	.955	-42.1762	18.631
Pre Public	Inter-private	18.1826	9.76591	.640	-12.2212	48.586
	Inter-foreign	16.3090	10.2520	.810	-15.6084	48.226
	Inter-public	14.4347	11.0735	.930	-20.0400	48.909
	Post-foreign	17.9027	10.2520	.717	-14.0147	49.820
	Post-private	16.7451	9.76591	.737	-13.6587	47.148
	Post-public	26.6910	11.0735	.280	-7.7837	61.165
	Pre-foreign	-22.8829	10.2520	.386	-54.8003	9.0345
	Pre-private	11.7723	9.76591	.955	-18.6315	42.176

Based on observed means.

The error term is Mean Square (Error) = 3372.116.

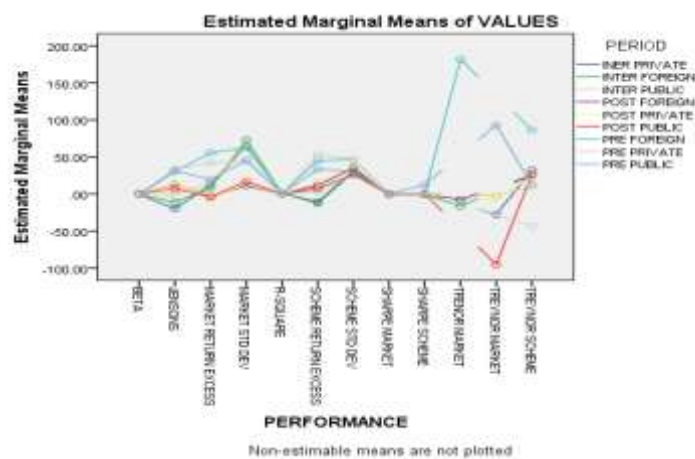
\*. The mean difference is significant at the .05 level.

The post hoc tests show the differences in model predicted means for each pair of factor levels. When the significance value for differences between performance and periods is less than .05 an asterisk (\*) showed the difference. This table helps us to conclude that pre foreign was better than inter private, inter foreign, inter public, post foreign, post private, post public and pre private as there are significant multiple comparisons among time periods by post hoc test.

### Diagrammatical Representation of Estimated Means

In SPSS General Linear Model it is easy to produce graphs of interaction effects for factorial designs, obtain means for different levels of factors adjusted for other terms in the model (estimated marginal means) and obtain test of pair-wise simple effects.

Figure -1



The visual display gave added benefit to assess the movement of business cycle (performance) with respect to time period. There is significant fluctuation (increase) in averages among inter private and inter foreign and decrease in pre and post public. Rest of performance indicators were closer to each other and post public appears to be most stable.

## IV. Findings And Conclusion

### General Linear Model (GLM)

- SPSS General Linear Model evidenced that equity performance indicators are significant at one percent with f-value (4.709) and period wise business cycle are even significant at one percent with f-value (3.684), even it is observed that there are interaction effects between performance and periods significant at 5 percent with f -value (1.415). Approximately 25.7 percent of variation is observed in performance with respect to movement in time periods.
- The standard deviation appears to be relatively homogenous across all time periods.
- Beta values of higher than unity imply higher portfolio risk for the schemes than the market portfolio, and vice-versa. On an average no beta value of equity schemes is greater than unity; hence it can be assumed that performance of beta in between the time periods is not risky.
- High values of coefficient of determination are observed for pre and intermediate period and low value for post period i.e. after effects of recession.

- Higher positive values of Sharpe ratio is observed during all time periods except inter-foreign and inter-private time periods.
- On an average all time periods reveals that inter-private and inter-foreign are more risky due to higher value of beta in Treynor's ratio.
- Higher alpha values are predicted during pre and post periods in all three sectors public, private and foreign. Lower values are observed during inter- time period in all three sectors.
- The post hoc tests show the differences in model predicted means for each pair of factor levels. This test conclude that pre foreign was better than inter private, inter foreign, inter public, post foreign, post private, post public and pre private as there are significant multiple comparisons among time periods by post hoc test.

### **Implications of the Study**

- This study is of immense importance to investors as there are a plethora of schemes available for them by public, private and foreign sector during different phases of trade cycle like boom, recession and recovery. Performance of mutual fund schemes will help investors, academicians, mutual fund managers and regulatory bodies for improving and making mutual fund investment more lucrative as compared to other investment alternatives. Mutual funds did not perform well during recession against the expectations of investors. Among all foreign sector performed well during pre period and none of the sectors performed well during inter period and approximately 25.7 percent of variation is observed in performance with respect to movement in time periods.

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