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- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

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- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19-22 June.

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**PORTFOLIO PERFORMANCE EVALUATION OF SELECTED SECTORS INDEX OF BSE**

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**ABSTRACT**

The models of evaluating portfolio's performance are based on two factors viz., Return and Risk, which are suitable for short term and a major shortcoming is that these models evaluate different types of investment companies by these same factors. This study suggests a model for evaluation of long-term portfolio's performance by accounting contingency multi criteria for each field of investment company classification. In this research paper we are going to evaluate the performance of different BSE sector index such as BSE BANKEX, BSE CG, BSE FMCG, etc with five different portfolio evaluation measures. i.e. Sharpe measure, Treynor measure, Jensen measure, Fama measure and  $M^2$  measure.

**KEYWORDS**

Portfolio Performance Evaluation, Sharpe, Treynor, Jensen, Fama, M Square

**INTRODUCTION**

Studies on portfolio performance evaluation began in the 1960's along with the development of modern asset pricing theory. After the selection of a portfolio, its performance is evaluated. Portfolio evaluation has been concerned with models, which indicate the type of components of the management process, which contributed to the results. Many measures have been used to evaluate investment performance. They include:

- Index of return per unit of total risk (Sharpe measure)
- Index of return per unit of systematic risk, (Treynor measure)
- Index of excess return relative to a benchmark, adjusted for systematic risk (Jensen measure).
- Index which compares the performance, measured in terms of returns, of a portfolio with the required return commensurate with the total risk associated with it. The difference between these two is taken as a measure of the performance of the fund. (Fama net selectivity)
- Index which adjust the portfolio return where volatility matches the volatility of market index. ( $M^2$  Measure)

**LITERATURE REVIEWS**

1. **Rahdari(2009)**, in his research paper titled "Evaluation of long term portfolio' performance" published in *Bimaquest - Vol. IX Issue 1, January 2009* used three portfolio performance measures. i. e. Sharpe, Treynor & Jensen to measure the performance of portfolio.
2. **Rashmi Shankar and Paroma Sanyal (2007)**, in their paper titled "Impact of ownership, competition and productivity on profitability and spreads in India's commercial bank sector following the 1991 reforms" This paper examines the performance of different banking sector index by using different portfolio performance measures.
3. **Indian Journal of Finance(2007)**, titled "Performance Evaluation and Future Prospects of Mutual Fund Industry in India" used different measure of portfolio performance evaluation for evaluating the performance of different mutual fund scheme.

**OBJECTIVES**

- To quantify the performance of selected sector Index of BSE in form of return (%) and Risk (Standard Deviation & Beta).
- To evaluate the performance of selected sector Index of BSE with the help of various Portfolio performance evaluation measures.
- Compare the performance of selected Sector Index of BSE and rank them with the help of each performance measure.

**HYPOTHESIS OF STUDY**

$H_0$  = There is no significance difference in the performance of selected sectors Index of BSE for a selected time period using Sharpe/Treynor/Jensen/Fama/ $M^2$  Measures. ( $\mu_1 = \mu_2 = \dots = \mu_{13}$ )

**RESEARCH DESIGN****SAMPLING**

For measuring the financial performance of Indian Stock Market thirteen different BSE Indices has been selected for measuring performance. These indices are BSE Realty, BSE Bankex, BSE CG, BSE CD, BSE Auto, BSE Oil & Gas, BSE PSU, BSE Metal, BSE IT, BSE Power, BSE FMCG, BSE HC, BSE Teck. The performance of these indices will be measure by taking BSE SENSEX 30 as market index.

**THE DATA COLLECTION AND PERIOD OF THE STUDY**

Quarterly closing Price movement of sample BSE sector Index data has been collected for a period of two year. (01/01/2011 to 31/12/2012). For Market risk & return as well as volatility BSE SENSEX will be used.

**TOOLS & TECHNIQUES**

1. For analyzing the quarterly closing price of selected indices tools like mean, standard deviation and beta have been used for finding risk and return.
2. For measuring the performance of selected indices theories and formulas of Sharpe, Treynor, Jensen, Fama and  $M^2$  measures have been applied on risk and return of selected indices.
3. For comparing the Index performance of different BSE Indices, One Way ANOVA test has been applied.

DATA ANALYSIS & INTERPRETATION

TABLE – 1 QUARTERLY RETURN OF SELECTED INDEX

Date	Sensex	Realty	Bankex	BSE CG	BSE CD	BSE Auto	BSE O&G	BSE PSU	BSE Metal	BSE IT	BSE Power	BSE FMCG	BSE HC	BSE Teck
11-Mar	6.1	4.86	10.24	-2.16	4.07	4.45	8	2.91	0.28	2.78	-1.17	6.83	-3.42	3.28
11-Jun	-3.08	-13.6	-3.6	5.08	6.64	-5.3	-10.08	-4.66	-6.8	-6.84	-3.69	12.49	6.21	-4.19
11-Sep	-12.69	-12.7	-15.37	-22.74	-4.39	-3.41	-7.75	-13.33	-27	-13.53	-18.63	-3.34	-8.29	11.99
11-Dec	-6.07	-13	-15.64	-24.9	-16.9	-4.17	-11.36	-14.03	-15.48	9.04	-15.5	3.19	0.05	3.96
12-Mar	12.61	29.17	28.38	24.3	21.16	24.45	7.41	14.87	22.09	5.74	16.43	11.34	12.86	5.39
12-Jun	0.15	-6.14	1.34	-0.03	-3.02	-6.68	-0.15	-0.73	-4.94	-5.21	-4.95	11.1	3.9	-6.12
12-Sep	7.65	10.74	10.33	9.3	11.77	10.1	7.26	2.17	-2.38	2.73	3.08	10.32	9.36	2.17
12-Dec	3.54	14.28	9.18	-0.82	11.23	9.73	-1.65	-1.09	5.15	-4.03	-2.83	7.42	8.02	0.32

\*Risk free rate of return in Dec2012 is 8.5% p.a. (T-bill Rate, RBI)

TABLE – 2 QUARTERLY INDEX PERFORMANCE EVALUATION TABLE AS PER SHARPE MEASURE

Date	Sensex	Realty	Bankex	BSE CG	BSE CD	BSE Auto	BSE O&G	BSE PSU	BSE Metal	BSE IT	BSE Power	BSE FMCG	BSE HC	BSE Teck
11-Mar	0.756	0.24	0.97	-0.463	0.288	0.316	1.029	0.148	-0.204	0.121	-0.44	1.28	-1.4	0.23
11-Jun	-0.949	-1.34	-0.664	0.337	0.65	-0.953	-2.08	-1.12	-1.036	-1.43	-0.78	2.8	1.08	-1.16
11-Sep	-2.734	-1.27	-2.053	-2.738	-0.91	-0.707	-1.68	-2.57	-3.404	-2.51	-2.83	-1.43	-2.7	-2.61
11-Dec	-1.504	-2.07	-2.085	-2.977	-2.68	-0.806	-2.3	-2.68	-2.054	1.13	-2.4	0.31	-0.6	0.36
12-Mar	1.967	2.34	3.11	2.462	2.697	2.917	0.928	2.147	2.354	0.598	1.98	2.49	2.8	0.63
12-Jun	-0.349	-0.7	-0.081	-0.227	-0.71	-1.132	-0.37	-0.46	-0.817	-1.17	-0.96	2.43	0.48	-1.52
12-Sep	1.044	0.75	0.98	0.804	1.374	1.052	0.9	0.024	-0.517	0.11	0.15	2.22	1.89	0.03
12-Dec	0.281	1.06	0.845	0.314	1.297	1.002	-0.63	-0.52	0.367	-0.98	-0.67	1.44	1.55	-0.32

ANOVA: Single Factor

Ho = There is no significance difference in the mean Sharpe portfolio measure in between different index.

Ha = There is significance difference in the mean Sharpe portfolio measure in between different index.

Interpretation: There is no enough evidence to reject null hypothesis which indicates that there is no significance difference in the mean Sharpe portfolio measure in between different index, which shows that all index perform in the same manner.

Source of Variation	SS	df	MS	F	F crit
Between Groups	36.36365	13	2.797204	1.191767	1.821327
Within Groups	230.0164	98	2.347106		
Total	266.3801	111			

TABLE – 3 QUARTERLY INDEX PERFORMANCE EVALUATION TABLE AS PER TREYNOR MEASURE

Date	Sensex	Realty	Bankex	BSE CG	BSE CD	BSE Auto	BSE O&G	BSE PSU	BSE Metal	BSE IT	BSE Power	BSE FMCG	BSE HC	BSE Teck
11-Mar	4.07	1.51	5.491	-2.96	1.98	1.98	6.52	0.87	-1.24	1.08	-2.54	12.18	-12	1.7
11-Jun	-5.11	-8.31	-3.758	2.16	4.47	-5.97	-13.2	6.55	-6.3	-12.7	-4.54	26.53	9.18	-8.4
11-Sep	-14.72	-7.86	-11.62	-17.54	-6.23	-4.43	-1067	-15.1	-20.7	-22.4	-16.4	-13.59	-23	-19.1
11-Dec	-8.09	-12.8	-11.8	-19.07	-18.4	-5.06	-14.6	-1573	-12.49	10.08	-13.9	2.96	-4.3	2.6
12-Mar	10.59	14.5	17.61	15.78	18.57	18.29	5.88	12.59	14.31	5.33	11.45	23.62	23.7	4.5
12-Jun	-1.88	-4.35	-0.46	-1.45	-4.9	-7.1	2.37	-2.7	-4.97	-10.4	-5.54	23.01	4.1	-11.1
12-Sep	5.62	4.64	5.55	5.15	9.46	6.59	5.71	0.14	-3.15	1.02	0.84	21.03	16.1	0.2
12-Dec	1.51	6.53	4.78	-2.12	8.93	6.28	-4.01	-3.06	2.23	-8.7	-3.86	13.68	13.1	-2.3

ANOVA: Single Factor

Ho = There is no significance difference in the mean Treynor portfolio measure in between different index.

Ha = There is significance difference in the mean Treynor portfolio measure in between different index.

Source of Variation	SS	df	MS	F	F crit
Between Groups	2437.027	13	187.4636	1.716429	1.821327
Within Groups	10703.29	98	109.2172		
Total	13140.31	111			

Interpretation: There is no enough evidence to reject null hypothesis which indicates that there is no significance difference in the mean Treynor portfolio measure in between different index, which shows that all index performs in the same manner.

TABLE – 4 QUARTERLY INDEX PERFORMANCE EVALUATION TABLE AS PER JENSEN MEASURE

Date	Sensex	Realty	Bankex	BSE CG	BSE CD	BSE Auto	BSE O&G	BSE PSU	BSE Metal	BSE IT	BSE Power	BSE FMCG	BSE HC	BSE Teck
11-Mar	0	-4.81	2.12	-9.93	-2.15	-2.56	2.25	-3.27	-7.45	-2.08	-8.32	3.2	-7.3	-1.73
11-Jun	0	-6.01	2.02	10.26	9.87	-1.06	-7.23	-1.47	-1.68	-5.31	0.71	12.49	6.52	-2.47
11-Sep	0	12.9	4.64	-3.99	8.75	12.61	3.71	-0.34	-8.39	-5.31	-2.14	0.45	-3.6	-3.22
11-Dec	0	-8.8	-5.55	-15.5	-10.6	3.73	-5.97	-7.8	-6.16	12.65	-7.34	4.36	1.72	7.87
12-Mar	0	7.28	10.51	7.33	8.22	9.44	-4.31	2.04	5.22	-3.66	1.08	5.14	6.01	-4.4
12-Jun	0	-4.64	2.13	0.6	-3.12	-6.4	-0.45	-0.84	-4.34	-5.93	-4.69	9.82	2.73	-6.77
12-Sep	0	-1.84	-0.11	-0.66	3.96	1.18	0.08	-5.59	-12.29	-3.21	-6.01	6.08	4.77	-3.97
12-Dec	0	9.42	4.89	-4.98	7.64	5.85	-5.06	-4.66	1	-7.11	-6.76	4.8	5.31	-2.82

ANOVA: Single Factor

Ho = There is no significance difference in the mean Jensen portfolio measure in between different index.

Ha = There is significance difference in the mean Jensen portfolio measure in between different index.



Source of Variation	SS	df	MS	F	F crit
Between Groups	981.3138	12	81.77615	2.509568	1.860124
Within Groups	2965.303	91	32.58574		
Total	3946.616	103			

**Interpretation:** There is enough evidence to reject null hypothesis which indicates that there is significance difference in the mean Jensen portfolio measure in between different index, which shows that some index performs well compared to others.

**TABLE – 5 QUARTERLY INDEX PERFORMANCE EVALUATION TABLE AS PER FAMA MEASURE**

Date	Sensex	Realty	Bankex	BSE CG	BSE CD	BSE Auto	BSE O&G	BSE PSU	BSE Metal	BSE IT	BSE Power	BSE FMCG	BSE HC	BSE Teck
11-Mar	0	-5.95	1.81	-11.03	-3.32	-3.39	1.58	-3.64	-8.19	-3.94	-8.71	1.98	-8.4	-2.81
11-Jun	0	-4.58	2.41	11.63	11.34	-0.03	-6.59	-1.01	-0.74	-2.98	1.2	14.02	7.87	-1.12
11-Sep	0	17	5.77	-0.04	12.98	15.58	6.11	1	-5.72	1.41	-0.72	4.86	0.29	0.68
11-Dec	0	-6.53	-4.93	-13.33	-8.29	5.36	-4.65	-7.06	-4.69	16.34	-6.56	6.79	3.85	10.02
12-Mar	0	4.31	9.69	4.48	5.18	7.31	-6.04	1.08	3.3	-8.49	0.06	1.96	3.21	-7.21
12-Jun	0	-4.12	2.27	1.1	-2.58	-6.02	-0.15	-0.67	-3.99	-5.07	-4.43	10.38	3.22	-6.27
12-Sep	0	-3.41	-0.54	-2.17	2.34	0.05	-0.84	-6.1	-13.31	-5.77	-6.56	4.39	3.29	-5.46
12-Dec	0	8.99	4.77	-5.39	7.21	5.54	-5.31	-4.8	0.73	-7.8	-6.9	4.35	4.91	-3.22

**ANOVA: Single Factor**

Ho = There is no significance difference in the mean fama portfolio measure in between different index.

Ha = There is significance difference in the mean fama portfolio measure in between different index.

Source of Variation	SS	df	MS	F	F crit
Between Groups	994.1256	12	82.8438	2.301266	1.860124
Within Groups	3275.93	91	35.99923		
Total	4270.056	103			

**Interpretation:** There is enough evidence to reject null hypothesis which indicates that there is significance difference in the mean Fama portfolio measure in between different index, which shows that some index performs well compared to others.

**TABLE – 6 QUARTERLY INDEX PERFORMANCE EVALUATION TABLE AS PER M<sup>2</sup> MEASURE**

Date	Sensex	Realty	Bankex	BSE CG	BSE CD	BSE Auto	BSE O&G	BSE PSU	BSE Metal	BSE IT	BSE Power	BSE FMCG	BSE HC	BSE Teck
11-Mar	0	-2.76	1.15	-6.56	-2.52	-2.37	1.47	-3.28	-5.17	-3.42	-6.43	2.84	-12	-2.81
11-Jun	0	-2.12	1.53	6.92	8.61	-0.02	-6.11	-0.91	-0.47	-2.58	0.89	20.18	10.9	-1.12
11-Sep	0	7.88	3.67	-0.02	9.85	10.91	5.66	0.9	-3.61	1.23	-0.53	6.99	0.4	0.68
11-Dec	0	-3.03	-3.13	-7.93	-6.29	3.75	-4.31	-6.35	-2.96	14.18	-4.84	9.78	5.35	10.03
12-Mar	0	1.99	6.16	2.67	3.93	5.12	-5.59	0.97	2.06	-7.37	0.04	2.83	4.46	-7.22
12-Jun	0	-1.91	1.44	0.66	-1.95	-4.22	-0.16	-0.6	-2.52	-4.4	-3.27	14.95	4.48	-6.28
12-Sep	0	-1.58	-0.35	-1.29	1.76	0.03	-0.78	-5.49	-8.41	-5.01	-4.84	6.32	4.57	-5.47
12-Dec	0	4.17	3.03	-3.21	5.47	3.88	-4.92	-4.32	0.46	-6.77	-5.1	6.26	6.81	-3.23

**ANOVA: Single Factor**

Ho = There is no significance difference in the mean M square (M<sup>2</sup>) portfolio measure in between different index.

Ha = There is significance difference in the mean M square (M<sup>2</sup>) portfolio measure in between different index.

Source of Variation	SS	df	MS	F	F crit
Between Groups	1053.283	12	87.77356	3.734469	1.860124
Within Groups	2138.83	91	23.50363		
Total	3192.113	103			

**Interpretation:** There is enough evidence to reject null hypothesis which indicates that there is significance difference in the mean M Square (M<sup>2</sup>) portfolio measure in between different index, which shows that some index performs well compared to others.

**FINDINGS**

The findings of the study are expressed in the following table:

**TABLE-7: COMBINED RANKING OF SELECTED SECTOR INDEX BY USING ALL PORTFOLIO PERFORMANCE MEASURE**

Index	Sharpe	Treynor	Jensen	FAMA	MM	Average	Ranking
Realty	6	6	6	6	6	6	6
Bankex	5	5	4	4	5	4.6	5
BSE CG	8	8	7	7	7	7.4	7
BSE CD	3	3	3	2	3	2.8	2
BSE Auto	4	4	2	3	4	3.4	4
BSE Oil& Gas	10	9	8	9	9	9	8
BSE PSU	12	10	11	11	11	11	11
BSE Metal	13	12	13	12	12	12.4	12
BSE IT	9	14	10	10	8	10.2	10
BSE Power	14	13	12	13	13	13	13
BSE FMCG	1	1	1	1	1	1	1
BSE HC	2	2	5	5	2	3.2	3
BSE Teck	11	11	9	8	10	9.8	9

1. The best performing Index out of the 13 selected sector index is BSE FMCG in all the different portfolio performance measures.

2. The top three performing index along with BSE FMCG is BSE CD & BSE HC, while bottom three performing index are BSE PSU, BSE Metal & BSE Power considering all five portfolio performance measures.

## CONCLUSION

Before the evolution of portfolio performance measure, investment has been done on the basis of historical return and risk of any particular security and it has been also evaluated on the basis of actual return and risk that this particular security or portfolio has generated. Now a day five different measure has been there for evaluating portfolio performance. In this study performance of different BSE index has been evaluated by using the different portfolio performance measures. From that evaluation we come to know that for a selected time period BSE FMCG is the best performing Index while BSE power is the worst performing index which can be reveal from ranking given in Table no. 7.

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