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A STUDY ON STOCK MARKET RETURN AND VOLATILITY ANALYSIS BETWEEN SENSEX WITH SECTORAL INDICES OF BOMBAY STOCK EXCHANGE

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ABSTRACT

The Sector-based index is designed to give a single value for the aggregate performance of a number of companies representing a sector of the economy. This study is an attempt to provide an empirical support to identify the volatility in sectoral indices and BSE Sensex index. The indices selected for the study are BSE Sensex index, BSE Auto index, BSE Bank index, BSE Consumer Durables index, BSE Capital Goods index, BSE FMCG index, BSE Information Technology index, BSE Healthcare index, BSE Metal index, power BSE Oil & Gas index, BSE PSU Bank index, and BSE Realty index, BSE Teck index for the period from January 2013 to June 2014. The study found that the correlation is significant for most of the indices are having more impact on sensex.

KEY WORDS: *BSE Sensex, Sectoral Indices and Exponential Trend, Auto correlation.*

JEL Classification code: G1, G11

INTRODUCTION

The index is calculated based on a free-float capitalization method when weighting the effect of a company on the index. This is a variation of the market cap method, but instead of using a company's outstanding shares it uses its float, or shares that are readily available for trading. The free-float method, therefore, does not include restricted stocks, such as those held

by company insiders that can't be readily sold. Over the past two decades in India, a number of actions have been taken for economic liberalization. At the same time, large number of steps has been taken to toughen the stock market such as opening of the stock markets to worldwide investors, policy, increased power of Securities Exchange Board of India (SEBI) and trading activities in derivatives. An Index is used to give information about the price movements of products in the financial, commodities or any other markets.

STATEMENT OF THE PROBLEM

The motives for introducing indices in India had been to contain the stock market volatility. There is an important issue of great concern and observation of the stock market volatility in the Bombay Stock Exchange. This paper analyzed the response for the stock market volatility during the study period January 2013 to June 2014. The volatility has been done for the BSE Sensex indices during 10 days after the return values. The actual returns of the stock market are calculated with the expected closing price of the stock market. It attempts to present an analysis of the stock market volatility of the whole BSE Sensex and 13 Sectoral indices.

REVIEW OF LITERATURE

- **Dr.G.Shanmugasundram and D.John Benedict (2013),** *"Volatility of the Indian sectoral indices- A study with reference to National Stock Exchange"* the study is an attempt to provide an empirical support to identify the risk factors in sectoral indices and CNX Nifty index and also to see the risk relationship in different time intervals. The results shows the two sample T-tests and one-way ANOVA between the subjects has been used to identify is there any differences in risk factor across the sectoral indices both the results show that there is no significant difference in the risk and the one-way ANOVA within the groups has used to identify is there any differences in risk by taking various time intervals and the results show that there is a significant difference of risk.
- **Dr.C.Nateson(et, al)(2013),** *"Spillover Effect of Volatility in BSE Sensex on BSE Sectoral indices"* the study found that not much attention has been given on volatility transmission to the sectoral indices from the major indices, that has contributed to find the spill over effect of volatility in Sensex on BSE sectoral indices. It results in the study that there is volatility transmission from BSE Sensex to the select sectors. On the other hand shocks to the stock returns in BSE Sensex do not transmit to BSE power and BSE tech.

OBJECTIVES OF THE STUDY

- To analyze the returns of S&P BSE Sensex index and its sectoral indices.
- To examine the level of volatility prevailing in S&P BSE Sensex index and its sectoral indices.

SCOPE OF THE STUDY

This study is an attempt to provide an empirical support to the return factors across the sectoral indices and S & P BSE Sensex index. It attempts to cover the level of volatility from S&P BSE Sensex index and its sectoral indices.

RESEARCH METHODOLOGY

Sources of data:-

The present study is based on the secondary data. The data have been collected from daily reports of BSE Sensex and 13 Sectoral Indices through Bombay Stock Exchange Official websites and Journals. The study period is from January 2013 to June 2014.

❍ Tools used for Analysis:-

For analyzing the data, the researcher has used Descriptive Statistics, Daily Return and Volatility, Auto Correlation and Exponential Trend.

❍ Daily Return:-

The return series for the indices selected for this study is first measured by the first difference of logarithm of respective indices. The return of any stock price index at time is calculated as:

$$R_t = \log (X_e) - \log (X_e - 1)$$

Where X_e and R_t denotes the closing value of stock price index and return respectively on the T^{th} day.

❍ Volatility:-

A statistical measure of the dispersion of returns for a given security or market index. Volatility can either be measured by using the standard deviation or variance between returns from that same security or market index. The higher the volatility, the riskier the security.

$$\sigma = \sqrt{\sum_{i=1}^{N} \frac{(ri - r)}{N - 1}}$$

Where N = Number of observation, r = return, r_i = return of period i.

❍ Auto Correlation:-

A mathematical technique, also called serial correlation, is the cross correlation of a signal with itself. Informally, it is the similarity between observations as a function of the time lag between them. It is often used in signal processing for analysing functions or series of values, time domain signals.

LIMITATIONS OF THE STUDY

The major limitations of the study are:

- The study is based on secondary data
- The study is applicable only to S&P BSE Sensex index and its sectoral indices.

Table 1- Descriptive Analysis of S&P SENSEX and Sectoral Indices

	SEN RET	SEN VOL	AUTO RET	AUTO VOL	BANK RET	BANK VOL	CON RET	CON VOL	CAP RET
Mean	0.000701	0.151977	0.000753	0.177116	0.000491	0.254178	0.000348	0.234364	0.001042
Standard Error	0.000529	0.003102	0.000604	0.003066	0.000896	0.005301	0.000847	0.005851	0.000893
Median	0.000657	0.140772	0.001132	0.169887	0.000603	0.240626	0.000848	0.208345	0.001070
Standard Deviation	0.010193	0.059094	0.011657	0.058418	0.017275	0.101007	0.016341	0.111484	0.017220
Sample Variance	0.000104	0.003492	0.000136	0.003413	0.000298	0.010202	0.000267	0.012429	0.000297
Kurtosis	1.544680	1.739397	1.535616	1.433043	2.968845	2.298868	4.674355	1.438167	1.499017
Skewness	-0.059188	1.219792	0.316111	1.014430	0.299720	1.236265	-0.612437	1.354805	0.125182
Range	0.077571	0.326054	0.091954	0.302489	0.146091	0.560885	0.153168	0.540038	0.137382
Minimum	-0.040537	0.038468	-0.033843	0.061719	-0.057123	0.069268	-0.087565	0.085907	-0.057316
Maximum	0.037034	0.364522	0.058111	0.364209	0.088968	0.630153	0.065603	0.625945	0.080066
Sum	0.260742	55.167663	0.280029	64.293036	0.182829	92.266467	0.129298	85.07417	0.387725
Count	372	372	372	372	372	372	372	372	372

Source: Calculated

	CAP VOL	FMCGRET	FMCGVOL	HEALRET	HEALVOL	IT RET	IT VOL	METALRET	METALVOL
Mean	0.254242	-0.000311	0.166175	-0.000911	0.142699	-0.001336	0.202704	-0.000396	0.247986
Standard Error	0.004434	0.000601	0.003792	0.000492	0.002428	0.000750	0.005346	0.000883	0.005361
Median	0.248785	-0.000812	0.140987	-0.000799	0.137154	-0.001230	0.172791	-0.000443	0.232188
Standard Deviation	0.084484	0.011592	0.072254	0.009484	0.046259	0.014475	0.101848	0.017038	0.102142
Sample Variance	0.007137	0.000134	0.005221	0.000090	0.002140	0.000210	0.010373	0.000290	0.010433
Kurtosis	-0.446587	2.915663	1.189294	0.753984	1.539223	16.071472	4.720928	1.797552	3.390439
Skewness	0.346814	0.143531	1.241268	0.108428	1.079013	0.905941	1.973730	-0.383872	1.569880
Range	0.396403	0.093072	0.376794	0.063335	0.252969	0.206871	0.541133	0.136251	0.557989
Minimum	0.075685	-0.051672	0.053249	-0.026027	0.049822	-0.089285	0.070205	-0.079055	0.096825
Maximum	0.472087	0.041400	0.430043	0.037308	0.302791	0.117586	0.611338	0.057196	0.654814
Sum	92.289826	-0.115854	60.321582	-0.339027	51.799673	-0.497030	73.581716	-0.147224	90.018927
Count	372	372	372	372	372	372	372	372	372

Source: Calculated

	OILRET	OILVOL	POWERRET	POWERVOL	PSURET	PSUVOL	REALTYRET	REALTYVOL	TECKRET	TECKVOL
Mean	-0.000719	0.218802	-0.000385	0.218039	-0.000411	0.209126	0.000120	3.319772	-0.001146	0.175836
Standard Error	0.000756	0.003959	0.000780	0.004288	0.000750	0.004166	0.001203	0.066135	0.000630	0.004061
Median	-0.000316	0.203937	-0.000831	0.193848	-0.000180	0.184823	0.000115	2.933978	-0.001256	0.147973
Standard Deviation	0.014588	0.075428	0.015035	0.081688	0.014467	0.079375	0.023208	1.260034	0.012142	0.077375
Sample Variance	0.000213	0.005689	0.000226	0.006673	0.000209	0.006300	0.000539	1.587687	0.000147	0.005987
Kurtosis	0.659377	0.024870	4.640942	2.826758	3.228746	2.466407	0.429772	2.466407	11.469134	4.994992
Skewness	-0.108769	0.849451	-0.428812	1.465656	-0.524503	1.499434	0.116192	1.499434	0.866266	1.972919
Range	0.100304	0.346993	0.142862	0.456089	0.134008	0.458184	0.137396	7.273438	0.156524	0.422655
Minimum	-0.051248	0.091962	-0.096676	0.094396	-0.086188	0.066743	-0.066791	1.059513	-0.063592	0.074239
Maximum	0.049056	0.438956	0.046186	0.550485	0.047819	0.524927	0.070605	8.332951	0.092932	0.496894
Sum	-0.267324	79.425258	-0.143289	79.148113	-0.152828	75.912733	0.044818	1205.077273	-0.426255	63.828485
Count	372	372	372	372	372	372	372	372	372	372

Source: Calculated

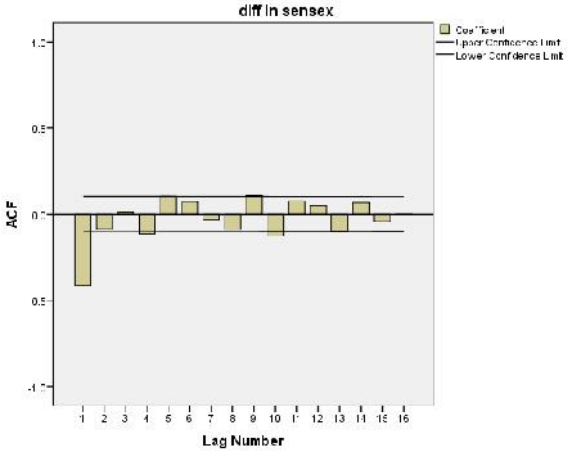
It is inferred from the table 1 that the mean value of return on sectors stood high in BSE IT index and volatility in BSE Realty index and low return in BSE Healthcare index and in volatility at healthcare. The returns of BSE Realty index are highly deviated and volatile in nature. Whereas the returns of BSE Auto index is less deviated. The return of BSE Healthcare index is less volatile in nature.

The skewness for volatility was all positive and for return the negative skewness occurred for S&P BSE Sensex, BSE Consumer durable, BSE Metal, BSE Oil & Gas, BSE Power and BSE PSU.

Test of Randomness for Difference in Returns of S & P BSE Sensex index and its sectoral indices:-

Auto Correlation had been used to test the randomness for difference in Returns of S & P BSE Sensex index and its sectoral indices.

H_0: The returns are independently distributed.



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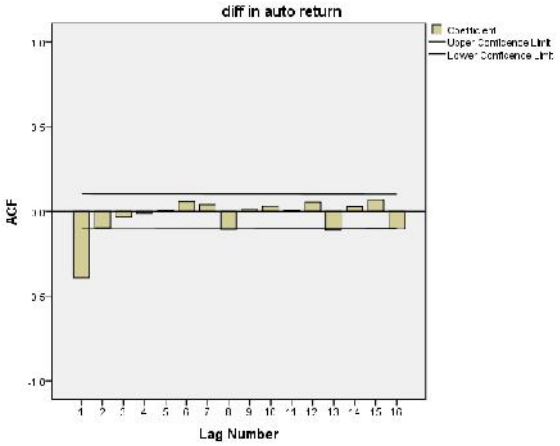

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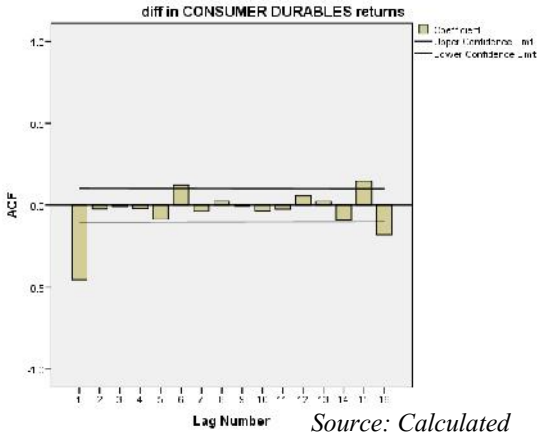

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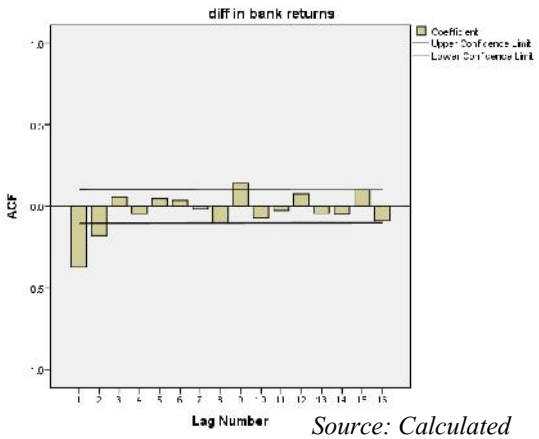

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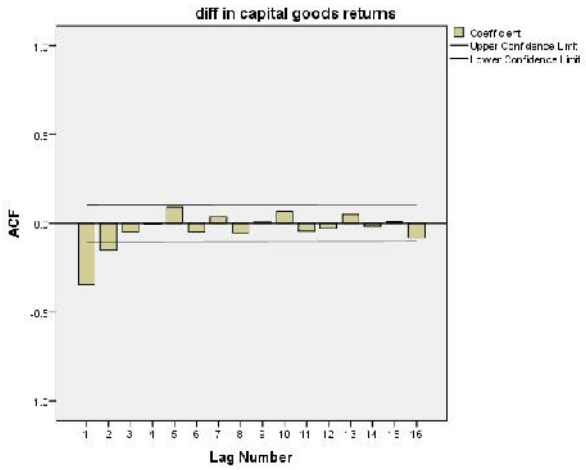

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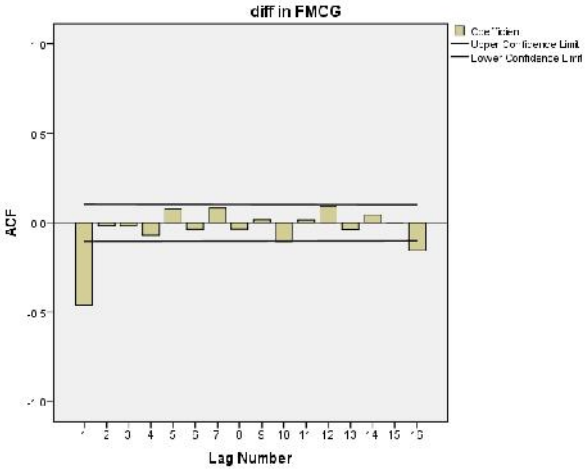

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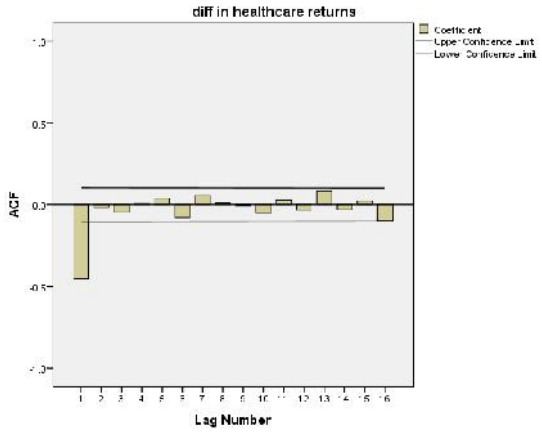

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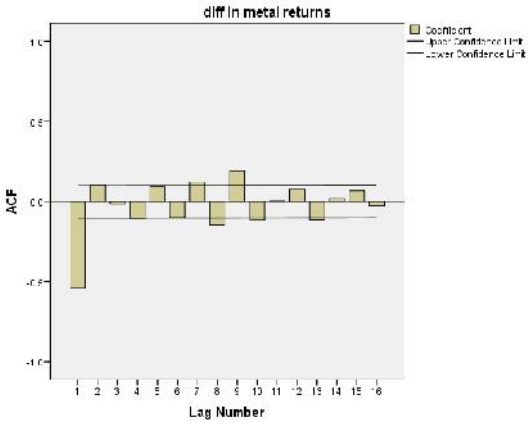

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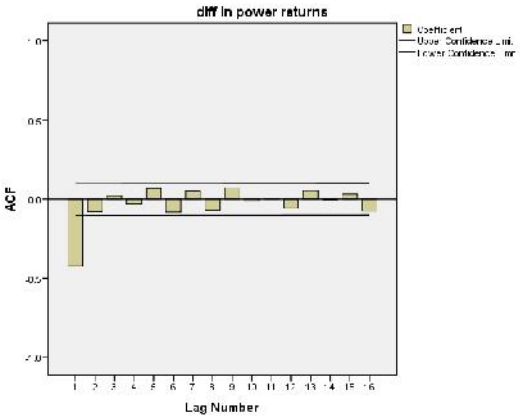

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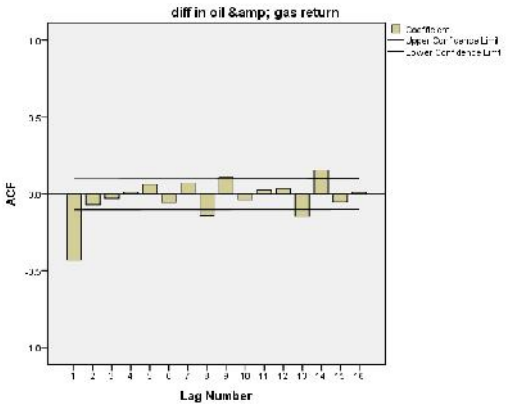

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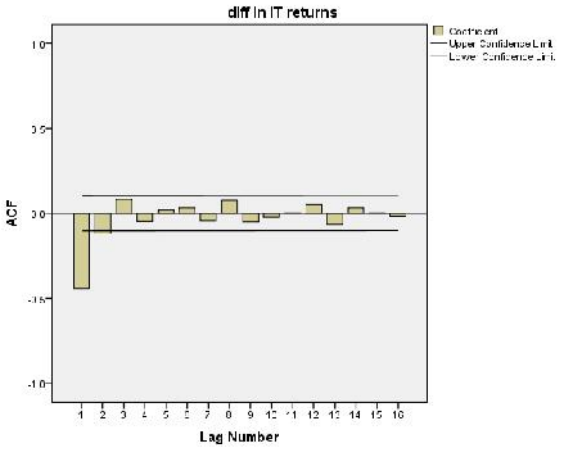

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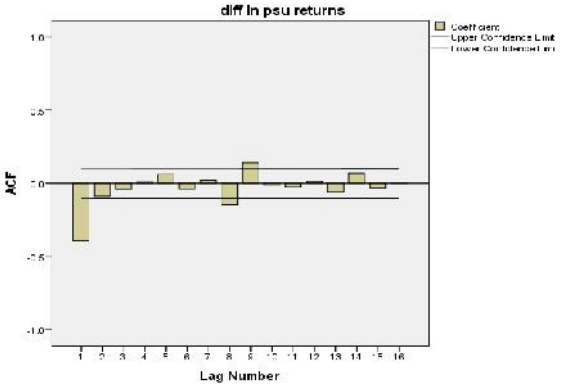

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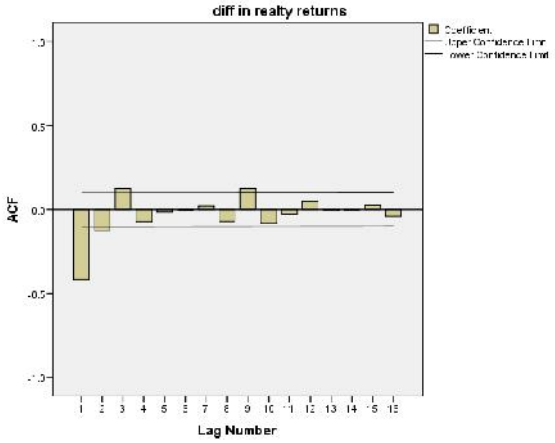

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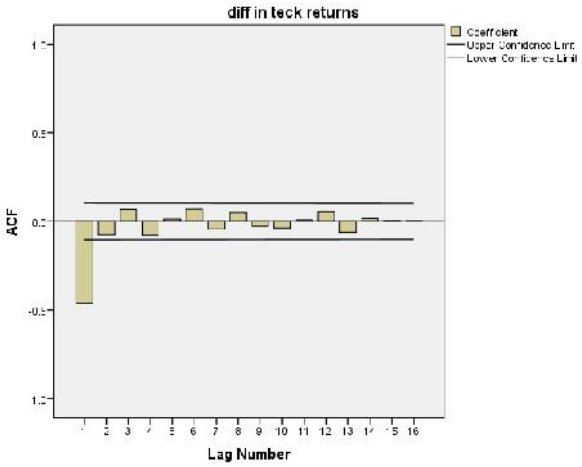
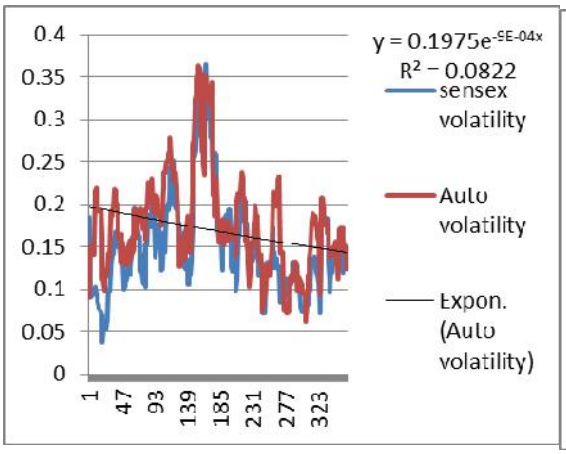


Source: Calculated

The above charts depict the autocorrelation function for the difference in returns of S & P BSE Sensex index and its sectoral indices. There is dependency in returns of BSE SENSEX and all sectoral indices like, Auto, Bank, Energy, Finance, FMCG, IT and ect.., as the Box-Ljung statistic values are less than the significance level. This shows that the future returns can be predictable with the help of past returns.

IMPACT OF SECTORAL INDICES ON SENSEX

The below charts depicts the impact of the sectoral indices on sensex.



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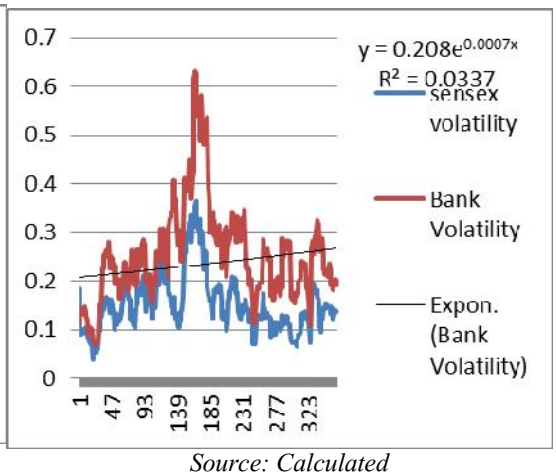

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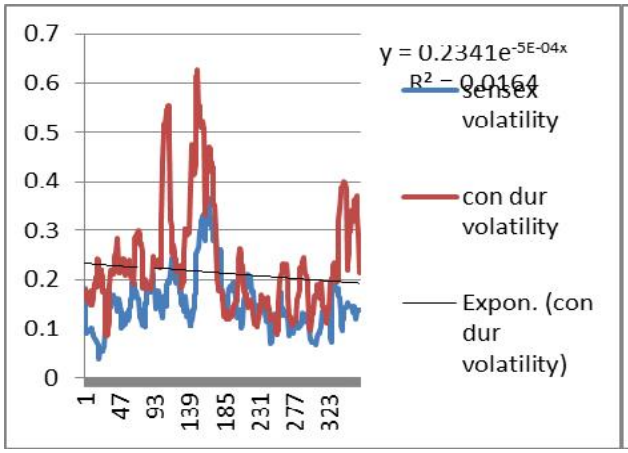

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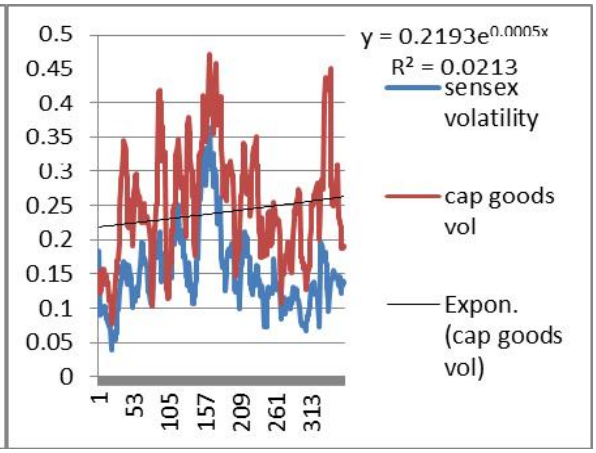

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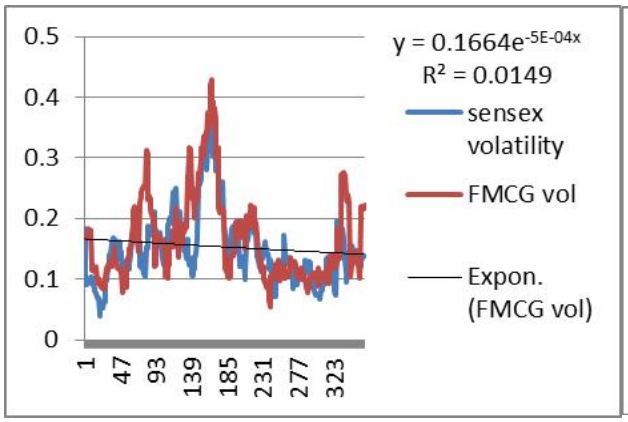

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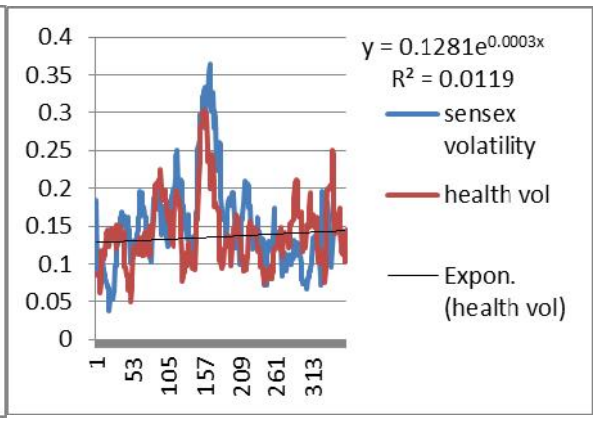

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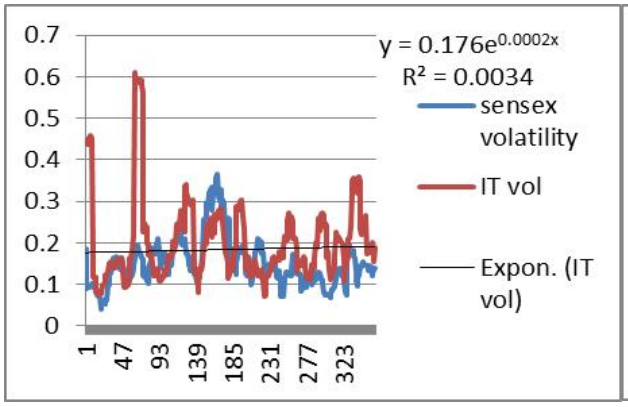

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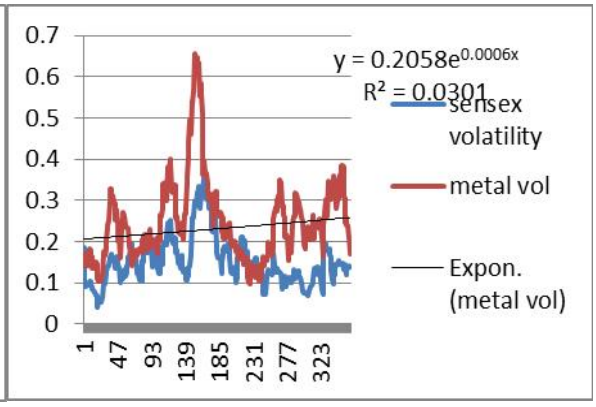

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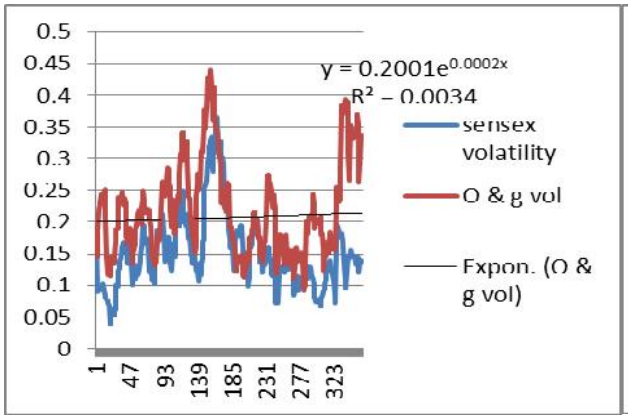

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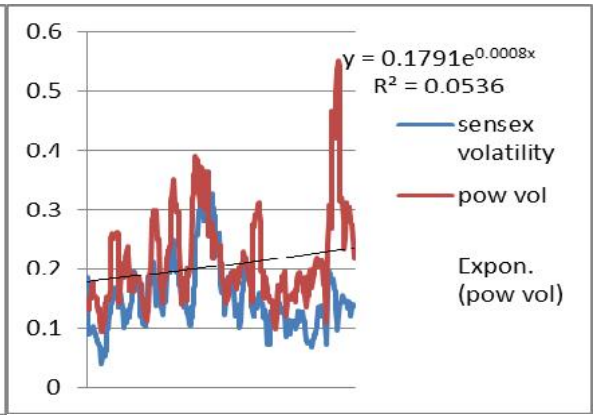

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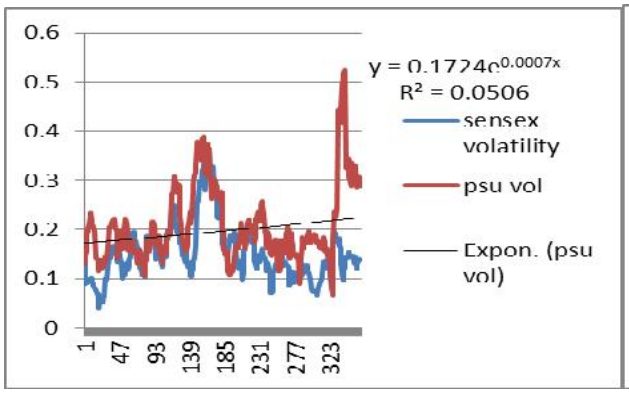

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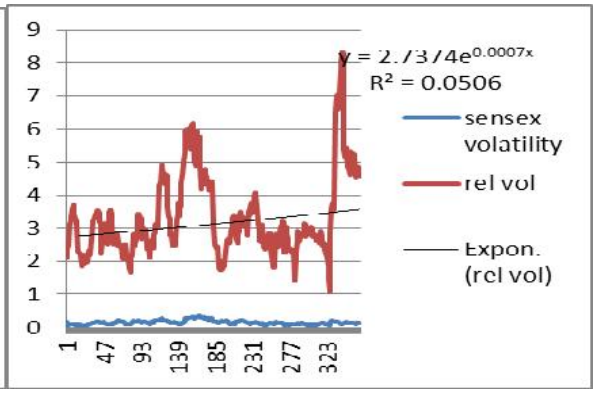

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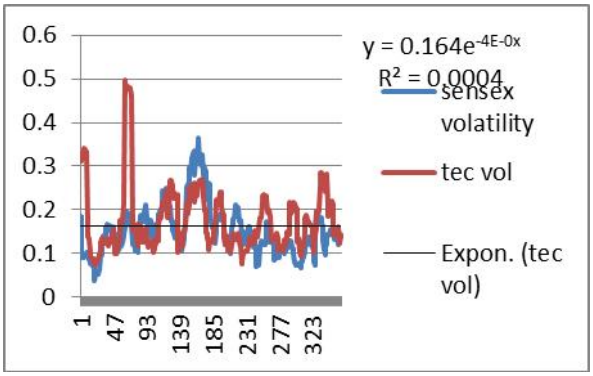

Source: Calculated

The above charts show the impact of select sectors on Sensex. It is inferred that the Sensex and selected sectors exponential trend has been able to capture the trend for one and a half year from 1.1.2013 to 23.6.2014. The R-square values show the Auto sector and Power have more impact on Sensex. Teck sectors have very low impact on Sensex during the study period.

CONCLUSION

The interrelationship among sectoral indices received a substantial attention in financial literature. This study is an attempt to provide the return and volatility across the sectoral indices and BSE Sensex index. The data used for the study has daily closing values of the stock indices covering a period of one and a half years starting from Jan 2013 to June 2014. The study found that the correlation is significant for most of the indices except the BSE Auto index, BSE Power index, BSE PSU Bank index, and BSE Realty index and further found that the All index have more impact on Sensex. The results exhibit important implications to individual investors and portfolio managers in terms of reducing portfolio risk and enhancing their returns.

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