THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

A Study on Performance of Sectoral Indices in Bombay Stock Exchange

Dr. P. Nageswari
Faculty, Department of Commerce, Bharathidasan University Constituent Arts & Science College Navalur Kuttapattu, Srirangam, Trichy, Tamil Nadu, India
Dr. A. Jeyachitra
Faculty, Department of Commerce, Bharathidasan University Constituent College for Women, Orathanadu, Thanjavur. Tamil Nadu, India
Dr. K. Desh
Faculty, Department of Commerce, Bharathidasan University Constituent College for Women, Vedharanyam, Tamil Nadu, India

Abstract:
An efficient and integrated stock market is an important infrastructure that influences capital formation and strengthens the capital market in a dynamic business environment. The sectoral indices analysis is typically employed by the investors who plan to select better diversified stocks to invest in. The investors normally identify the most promising sectors and review the performance of companies within the sector to determine which individual stock would provide better returns and invest accordingly. This study investigated the performance of S&P BSE Sectorial Index returns from April 2009 to March 2013. For the purpose of this analysis the study used five Sectorial Indices are S&P BSE AUTO, S&P BSE BANKEX, S&P BSE FMCG, S&P BSE IT and S&P BSE METAL. The study used Descriptive Statistics, ADF and GRACH model carried out on the all the sample sectors. The result of the study found that the Highest Mean Return was performed by S&P BSE AUTO Index and the Lowest Mean Returns were earned by S&P METAL Index with high risk. These findings have important implications for regulators, financial analysts and investors and would help them to develop appropriate investment strategies.

Keywords: *Bombay stock exchange, capital market, performance, sectoral indices*

1. Introduction

An efficient and integrated stock market is an important infrastructure that influences capital formation and strengthens the capital market in a dynamic business environment. The capital formation process largely depends upon the efficiency of the stock market; whereas, market co-integration helps in strategic investment and portfolio management. A market in which the prices fully reflect all available information is called efficient. An Efficient Stock Market provides the vehicle for mobilizing savings and investment resources for developmental purposes (Fama, 1961, 1991). Moreover, the analysis of different sectoral indices facilitates the investors to use it as innovative investment opportunity in their portfolio management. Stock markets have emerged as the major channel for financial integration of emerging market economies along with globalization, deregulation and advances in information technology. The sectoral indices analysis is typically employed by the investors who plan to select better diversified stocks to invest in. The investors normally identify the most promising sectors and review the performance of companies within the sector to determine which individual stock would provide better returns and invest accordingly. The sector-based index is designed to provide a single value for the aggregate performance of a number of companies representing a group of related industries within a sector of the economy and registered in the stock exchange.

The Bombay stock exchange (BSE) and The National stock exchange (NSE) are the two primary exchanges in India. BSE provides an efficient and transparent market for trading in equity, debt instruments and derivatives. It has a nationwide reach with a presence in more than 359 cities and towns of India. BSE has always been at par with the international standards. The systems and processes are designed to safeguard market integrity and enhance transparency in operations. BSE is the first exchange in India and the second in the world to obtain an ISO 9001:2000 certifications. It is also the first exchange in the country and second in the world to receive Information Security Management System Standard BS 7799-2-2002 certification for its BSE On-line Trading System (BOLT).

2. Review of Literature

A brief review of literature has been presented here to identify the research gap and appropriate methodologies to be employed in the area of research.

Rawashdeh and Squalli, (2005). In this study, to analyze market efficiency across the four sectors of the Amman Stock Exchange, by using daily Sectorial Indices. It found that the Random Walk and Weak Form Efficiency Hypotheses were rejected for all sectors. Furthermore, it found that returns, fit a mean-reverting process which may suggest abnormally high volatility, overinflated stock prices, and frequent market corrections from a bubble effect. This also indicated that investments in all sectors of the Amman Stock Exchange may be very risky in the short run. Chin, (2008), tested the Weak Form Market Efficiency by using daily return of nine Sectorial Indices in Malaysian Stock Market; it found that the empirical results were in sharp contrast to the traditional Unit Root Test which ignored the economic crisis and currency control. The study found that the Sectoral Indices of Malaysian Stock Market, except the property index were inefficient weak-form. Mohamed El Hedi Arouri and Duc Khuong Nguyen (2010), examined short-term linkages in the aggregate as well as, sector by sector levels in Europe using different econometric techniques. The study found that oil-sensitive stocks in Europe may, when oil prices are expected to increase, select stocks from sectors, such as Oil and Gas, with high positive sensitivity to oil prices. Alternatively, when oil price is expected to decrease, they may select sectors with negative sensitivity such as Food and Beverages. It also suggested that the reactions of stock returns to oil price changes differ greatly depending on the activity sector. In the out-of-sample analysis showed that introducing oil asset into a diversified portfolio of stocks allows to significantly improving its risk-return characteristics. Nageswari. P and Selvam.M (2011) tested the seasonal Analysis in the Indian Stock market. The study found that there was a maximum return earned on Wednesday and negative returns recorded on Monday during the study period. The Study also provides evidence that the market was not able to price the risk appropriately as higher returns were possible by taking less risk and this indicates market inefficiency. The Study found out that the day of the week effect and monthly effect pattern did not appear to exist in Indian Stock Market. Ramkumar, et al., (2012) conducted to analyze the market efficiency in 12 Sectorial Indices of Bombay Stock Exchange in India. The result of the study suggested that the investor may invest the money in the highly performing indices like BSE Automobile Index, BSE Bankex, BSE Capital Goods Index, BSE Consumer Durables, BSE Health Care Index, BSE Information Technology Index, BSE Metal Index, BSE Oil & Gas Index, BSE PSU Index and BSE Realty Index and may earn higher returns. Suresh and Tiwari, (2012), A Structural Co-integration Approach was applied to find long run and short run linkages between stock indices in Bombay Stock Exchange. The study found that out of the 37 models estimated, only in 6 models found co-integration relationship; but out of the nine indices, six indices posses' co-integration relationship with at least one of the other indices. These indices were Auto, Oil and Gas, Health Care, Information Technology, Consumer Durables and Capital Goods. Among this Oil and Gas Index was co-integrated with Consumer Durables Index and Capital Goods Index. Similarly Information Technology Index was co-integrated with Auto Index and Consumer Durables Index. Three indices such as Bankex, Metal, and FMCG did not show any long run relationship with any of the other sectors. Shanmugasundram G., and John Benedict. D (2013), investigated the volatility of Indian Sectoral Indices in NSE. The study found that there was highest return earned by the IT industry followed by Auto and FMCG with high risk than the Nifty Index returns.

3. Statement of the Problem

The investor does not aware about the share price behavior for the different Sectorial indices in Bombay Stock Exchange. So this study helps the investors in finding out which sector is performing well and what are the sectors are provide better return for the investment.

The study mainly focuses in Sectorial indices in BSE and this study attempts to find out the volatility through the way of risk and return in selected Sectorial indices listed in BSE.

4. Objectives of the Study

- To analyze performance of selected Sectorial index returns listed in BSE.
- To examine the Stationarity of selected Sectorial indices in BSE.
- To test the impact of share price volatility of selected Sectorial indices in BSE

5. Hypothesis of the Study

The present study examines the following null hypothesis.

- NH_1: There is no normality in the returns of selected Sectorial indices in BSE
- NH_2: There is non -stationary in the returns of selected Sectorial indices of BSE.
- NH_3: There is no volatility in the returns of selected Sectorial indices in BSE.

6. Methodology of the Study

6.1. Sample Selection

There are totally 13 Sectorial indices in Bombay Stock Exchange. In this study focused top 5 Sectorial indices of BSE have been taken as sample under the basis of performance. The details of samples are S&P BSE AUTO, S&P BSE BANKEX, S&P BSE FMCG, S&P BSE IT, S&P BSE METAL.

6.2. Sources of Data

In this study was fully based on the available secondary data which is collected from the BSE official website (www.bseindia.com), Books, Journals related to this study.

6.3. Period of the Study

The present study covers 4 years from 1st April 2009 to 31st March 2013.

6.4. Tools Used for Analysis

6.4.1. Descriptive Statistics

In this part, Statistics of the daily average returns, Standard deviation, Skewness and Kurtosis were analyzed.

6.4.2. Augmented Dickey-Fuller Test

An Augmented Dickey-Fuller Test (ADF) is a test for a unit root in a time series sample.

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \cdots + \delta_p \Delta y_{t-p} + \varepsilon_t, \quad \text{--------(1)}$$

Where

α is a constant, β the coefficient on a time trend and *p* the lag order of the autoregressive process. Imposing the constraints α = 0 and β = 0 corresponds to modelling a random walk and using the constraint β = 0 corresponds to modelling a random walk with a drift.

6.4.3. GARCH (1, 1) Model

A deficiency of ARCH (q) Models is that the conditional standard deviation process has high frequency oscillations with high volatility, coming at short bursts. GARCH Models permit a wider range of behavior, in particular, more persistent volatility. The GARCH (p, q) model is

GARCH (q, p) → $\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} (\alpha_i \times \varepsilon_{t-i}^2) + \sum_{i=1}^{p} (\beta_i \times \sigma_{t-i}^2)$ --------(2)

Where,

α_0: Independent coefficient.

α_1: Coefficients for **q** order or dependency on former squared errors (or returns)

β_1: Coefficient for **p** order or dependency on former variance of errors.

Since past values of that σ_t^2 process are fed back into the present values, the conditional standard deviation can exhibit more persistent periods of high or low volatility than seen in an ARCH process. They are to the power of 2 not in the same units as the data itself.

7. Limitations of the Study

- The study is limited to 4 years only.
- The study selected only 5 Sectors out of 13 Sectors.
- This study was based only on secondary data.

8. Results and Analysis of the Study

The following are the results and analysis of S&P BSE AUTO, BANKEX, FMCG,IT and METAL INDEX from 1st April-2009 to 31st March-2013

8.1. Analysis of Descriptive Statistics for S&P BSE Sectorial Index returns

The Descriptive statistics for S&P BSE AUTO, BANKEX, FMCG,IT and METAL INDEX from 1st April-2009 to 31st March-2013 is shown in Table 1. It explained that, there was positives mean return recorded for all the sample indices and the highest in Auto index (0.00118) and the standard deviation of 0.01466. During the study period lowest mean return recorded by the Metal Index with the highest risk (Std.Dev.) of 0.01991. The values of Skewness confirmed that all the indices were positively skewed, which lies between 0.1903- 1.066. The Kurtosis measures of return distribution were greater than 3 for all sample indices, hence, it's proved that Leptokurtic for sample Index returns . The Jarque – Bera test value was greater than 3 for the result. It clearly denotes that all the Index returns were not normally distributed during the study period.

Variables	Auto Index	Bankex	FMCG	IT Index	Metal
Mean	**0.00118**	0.00104	0.00107	0.00107	0.00040
Std. Dev.	0.01466	0.01745	0.01127	0.01564	**0.01991**
Skewness	0.45750	1.06641	0.42086	0.19038	0.49667
Kurtosis	6.23146	13.6580	5.82403	10.9434	7.09908
Jarque-Bera	468.103	4902.895	360.371	2624.595	738.252
Observations	996	996	996	996	996

Table 1: Results of Descriptive statistics for S&P BSE AUTO, BANKEX, FMCG, IT and METAL INDEX from 1st April-2009 to 31st March-2013

Source: www.bseindia.com *Computed from: EViews 7.0*

8.2. Analysis of Augmented Dickey-Fuller test Statistic for S&P BSE Sectorial Index returns

Table 2 given the results of Augmented Dickey Fuller test Statistics for S&P BSE AUTO, BANKEX, FMCG,IT and Metal Index from 1st April-2009 to 31st March-2013. It can be observed that the ADF t-statistic value is higher than the test critical values at 1%, 5% and 10% level respectively. It indicated that the returns of sample indices were stationary at 1% significant level. Hence null hypothesis "There is non- stationary in the returns of selected Sectorial indices of BSE" is rejected

S &P BSE AUTO INDEX		**t-Statistic**	**Prob.***
Augmented Dickey-Fuller test statistic		-18.28242	0.0000
Test critical values:	1% level	-3.436716	
	5% level	-2.864239	
	10% level	-2.864239	
S &P BSE BANKEX		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-27.64806	0.0000
Test critical values:	1% level	-3.436703	
	5% level	-2.864233	
	10% level	-2.568256	
S &P BSE FMCG		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-32.62531	0.0000
Test critical values:	1% level	-3.436703	
	5% level	-2.864233	
	10% level	-2.568256	
S &P BSE IT		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-30.57478	0.0000
Test critical values:	1% level	-3.436703	
	5% level	-2.864233	
	10% level	-2.568256	
S &P BSE METAL		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-29.01869	0.0000
Test critical values:	1% level	-3.436703	
	5% level	-2.864233	
	10% level	-2.568256	

Table 2: Augmented Dickey-Fuller test statistic for S&P BSE Sectorial Index returns from 1st April-2009 to 31st March-2013

Source: www.bseindia.com *Computed from: EViews 7.0*

8.3. Analysis of Volatility for S&P BSE Sectorial Index returns

The results of the mean and variance equations of GARCH (1, 1) Model for the S&P BSE AUTO Index daily returns from April 2009 to March 2013is exhibited in Table 3 It is to be noted that C represents the constant variable, which was taken as the bench mark. In the mean and variation equation there is significant volatility for AUTO INDEX return. The sum of (α+β) RESID(-1)^2 & GARCH(-1) value is 0.98, which is nearly 1 and significant at 1% risk level. In indicates that there is significant volatility in S&P BSE AUTO Index daily return.

Mean Equation				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.000954	0.000520	1.835668	0.0664
AR(1)	0.109829	0.032004	3.431721	0.0006
Variance Equation				
C	3.91E-06	1.00E-06	3.907279	0.0001
RESID(-1)^2	0.063750	0.011545	5.522096	0.0000
GARCH(-1)	0.920462	0.012005	76.67126	0.0000

Table 3: Estimated GARCH (1, 1) Model for S&P BSE BANKEX Daily Returns from April 2009 to March 2013
Source: www.bseindia.com *Computed from: EViews 7.0*

Table 4 demonstrates the results of the mean and variance equations of GARCH (1, 1) Model for the S&P BSE BANKEX daily returns. In the mean equation there is no significant volatility, but in variance equation there is significant volatility at 1% level.

Mean Equation				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.000873	0.000464	1.879684	0.0602
AR(1)	0.096874	0.031863	3.040273	0.0024
Variance Equation				
C	2.06E-06	6.85E-07	3.006074	0.0026
RESID(-1)^2	0.030897	0.007428	4.159691	0.0000
GARCH(-1)	0.956398	0.007891	121.2060	0.0000

Table 4: Estimated GARCH (1, 1) Model for S&P BSE AUTO Daily Returns from April 2009 to March 2013
Source: www.bseindia.com *Computed from: EViews 7.0*

Table 5 shows the results of the mean return and variance equations of GARCH (1, 1) Model for the S&P BSE FMCG Index daily returns from April 2009 to March 2013. In the mean and variation equation there is significant volatility for FMCG INDEX return.

Mean Equation				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.000981	0.000328	2.995434	0.0027
AR(1)	-0.011342	0.030015	-0.377891	0.7055
Variance Equation				
C	1.43E-06	4.77E-07	2.993351	0.0028
RESID(-1)^2	0.021317	0.006379	3.341999	0.0008
GARCH(-1)	0.963776	0.008691	110.8914	0.0000

Table 5: Estimated GARCH (1, 1) Model for S&P BSE FMCG Daily Returns from April 2009 to March 2013
Source: www.bseindia.com *Computed from: EViews 7.0*

The results of GARCH (1, 1) Model for the S&P BSE IT Index daily returns from April 2009 to March 2013 exhibited in Table 6 The above table clearly understood that there is significant volatility in mean and variation equation for IT INDEX return.

Mean Equation				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.001307	0.000474	2.754681	0.0059
AR(1)	0.057085	0.034338	1.662454	0.0964
Variance Equation				
C	3.25E-05	5.05E-06	6.430213	0.0000
RESID(-1)^2	0.134251	0.023991	5.595790	0.0000
GARCH(-1)	0.732915	0.039621	18.49817	0.0000

Table 6: Estimated GARCH (1, 1) Model for S&P BSE IT Daily Returns from April 2009 to March 2013
Source: www.bseindia.com *Computed from: EViews 7.0*

Table 7 shows the results of GARCH (1, 1) Model for S&P BSE METAL Index daily returns from April 2009 to March 2013. In the mean equation there was negative coefficient value and not significant at 5% level, but in the variation equation there is high coefficient value of C and significant volatility for METAL INDEX return. The sum of (α+β) RESID (-1)^2 & GARCH(-1) value is 0.98, and significant at 1% risk level. It indicates that there is significant volatility in S&P BSE METAL Index daily return. Hence, the Null hypothesis "There is no volatility in the returns of selected Sectorial indices in BSE" is rejected.

Mean Equation				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	-0.000201	0.000564	-0.356905	0.7212
AR(1)	0.071617	0.033844	2.116116	0.0343
Variance Equation				
C	4.57E-06	1.51E-06	3.015984	0.0026
RESID(-1)^2	0.048056	0.011882	4.044333	0.0001
GARCH(-1)	0.935811	0.012714	73.60501	0.0000

Table 7: Estimated GARCH (1, 1) Model for S&P BSE METAL Daily Returns from April 2009 to March 2013
Source: www.bseindia.com Computed from: EViews 7.0

9. Findings of the Study

9.1. The Following Are the Findings of the Study

- Among the Sample sectors S&P BSE AUTO Index yielded the highest return (0.0011) with normal risk level (standard deviation 0.0110) followed by FMCG and IT industry
- During the study period there were lowest returns (0.0040) performed by S&P METAL Index with high risk (standard deviation 0.0199).
- The values of Skewness confirmed that all the indices were positively skewed, which lies between 0.1903- 1.066.
- The Kurtosis measures of return distribution were greater than 3 for all sample indices; hence, it's proved that Leptokurtic for sample Index returns.
- The Stationarity analysis of sample sectors identified that the t-statistic values were higher than the critical value at 1%, 5% and 10% significant level. .
- Volatility analysis of GARCH Model found that there was significant volatility in variance equation and significant at 1% risk level.

10. Suggestions of the Study

- The present study suggested that the investors may study the performance of the S&P BSE sectors from time to time in term of risk and sensitivity returns.
- Based on this study it's better to invest in Automobile industries and FMCG may provide higher returns.
- The regulators or controllers of Metal industry must analyze the least performance and the high risk level for future growth
- The policy makers watch the variability of Sectorial index returns and control the same.

11. Conclusion

This paper investigated the performance of S&P BSE Sectorial Index returns from April 2009 to March 2013. For the purpose of this analysis the study used five Sectorial Indices are S&P BSE AUTO, S&P BSE BANKEX, S&P BSE FMCG, S&P BSE IT and S&P BSE METAL. The study used Descriptive Statistics, ADF and GRACH model carried out on the all the sample sectors. The result of the study found that the Highest Mean Return was performed by S&P BSE AUTO Index and the Lowest Mean Returns were earned by S&P METAL Index with high risk. The Stationarity analysis of sample sectors identified that the t-statistic values were higher than the critical value at 1%, 5% and 10% significant level. The study also found that there was significant volatility at 1% risk level. These findings have important implications for regulators, financial analysts and investors and would help them to develop appropriate investment strategies.

12. References

1. Donald, E.Fischer &Jordoan,J., (2005). Security Analysis and Portfolio Management. Prentice Hal of India, New Delhi.
2. Punithavathy Pandian(2005). Security Analysis and Portfolio Management. Prentice Hall of India, New Delhi.
3. Blitz David C., and Pim van Vliet (2007). The Volatility Effect. The Journal of Portfolio Management, 25(1), 102-113.
4. Chin, Wen Cheong (2008). A Sectoral Efficiency Analysis of Malaysian Stock Exchange under Structural Break. American Journal of Applied Sciences, 5(10), 1291-1295.
5. Fama, Eugene and Kenneth French(1992). The Cross-Section of Expected Stock Return. Journal of Finance,47(2) ,427-465.
6. Krishnankutty,Raveesh and Tiwari, Aviral K. (2011). Are the Bombay Stock Exchange Sectoral Indices of Indian Stock Market Co-integrated? Evidence Using Fractional Co-integration Test. Journal of Emerging Financial Markets, 2(1), 37-45.

7. Mohamed El Hedi Arouri and Duc Khuong Nguyen (2010). Oil Prices, Stock Markets and Portfolio Investment: Evidence from Sector Analysis in Europe over the Last Decade.hal-00507823,1-1 Ag 2010.
8. Nageswari.P & M.Selvam (2011). An Empirical Study on Seasonal Analysis in the Indian Stock Market. International Journal of Management and Business Studies (IJMBS), Vol.1, No.4, pp-90-95
9. Ramkumar, R., Selvam, M., Vanitha, S., Gayathri, J. and Karpagam, V. (2012). An Analysis of Market Efficiency in Sectoral Indices: A Study with a Special Reference to Bombay Stock Exchange in India. European Journal of Scientific Research, 69(2), 290-297.
10. Rawashdeh, Mufeed and Squalli, Jay (2005). A Sectoral Efficiency Analysis of the Amman Stock Exchange. Economic Policy Research Unit. Working Paper No. 05-04, December.
11. Saluja, H.S, TotalaN.k, Ira Bapna and Vishal Sood. Efficiency and Co-integration of SENSEX and Sectoral Indices of Bombay Stock Exchange: A Shift to Dynamic Business Environment. Altius Shodh Journal of Management and Commerce, 1(2), 89-96.
12. Shanmugasundram G., and John Benedict .D (2013). Volatility of the Indian Sectoral Indices - A Study with Reference to National Stock Exchange. International Journal of Marketing, Financial Services & Management Research, 2(8), 1-11.
13. Suresh,K.G., Tiwari, Aviral K. (2012). Long Run and Short Run Linkages between Stock Indices in Bombay Stock Exchange: A Structural Co-integration Approach. Journal of Quantitative Economics, 10(1), 177-181.