



An Analysis of Weak Form Efficiency in Sectoral Indices: A Study with Reference to National Stock Exchange

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ABSTRACT

Capital market plays an pivotal role in the growth of economy and meeting country's socio economic goals. They are an important constituent of the financial system, given their role in the financial intermediation process and capital formation of the country. Apprehend that stock market is the backbone of our country it is essential to analyses the weak form efficiency of Indian stock market so as to assess the efficiency of Indian stock market and give suggestions to the investors to make their decisions on their investment. For the purpose of the study, the biggest stock exchange National Stock Exchange has been selected. The study has used the daily closing price of the stock from 1st Apr 2009 to 31st Mar 2014 comprising total of seven sectors. To test the Market Efficiency the study has used tests like Augmented Dickey Fuller test, pp Phillip Perron test, Runs Test and Autocorrelation. These tests are used to analyze stationary, randomness, efficiency for the data collected. To test the volatility T-Garch has been used. The study reveals drifts in market efficiency which offers investors a diversified way to make their investment activities in effective manner.

KEYWORDS : Economy, Indian stock market, National Stock Exchange, Efficiency

INTRODUCTION

A capital market is one in which individuals and institutions trade financial securities. In economics, typically, the term market means the aggregate of possible buyers and sellers of a certain good or service and the transactions between the financial markets can be found in nearly every nation in the world. Investors have access to a large number of financial markets and exchanges representing a vast array of financial products. Organizations and institutions in the public and private sectors also often sell securities on the capital markets in order to raise funds. Thus, this type of market is composed of both the primary and secondary markets

STOCK MARKETS

Stock markets allow investors to buy and sell shares in publicly traded companies. They are one of the most vital areas of a market economy as they provide companies with access to capital and investors with a slice of ownership in the company and the potential of gains based on the company's future performance. This market can be split into two main sections: the primary market and the secondary market. The primary market is where new issues are first offered, with any subsequent trading going on in the secondary market.

MARKET EFFICIENCY

The concept of efficiency is vital to finance. Primarily, the term efficiency is used to describe a market in which relevant information is seized into the price of financial assets. The concept of market efficiency has been anticipated at the beginning of the century in the dissertation submitted by Bachelier (1900) to the Sorbonne for his PhD in mathematics. In his opening paragraph, he recognizes that "past, present and even discounted future events are reflected in market price, but often show no apparent relation to price changes".

Forms of market efficiency has also been introduced, this framework was first time proposed by Fama (1970), where he divided market efficiency into three forms of weak form, semi-strong form and strong form depending on the kind of information prices should incorporate. Weak form of efficiency is a market condition wherein current security prices fully reflect all information contained in historical prices. Under semi- strong form of efficiency, prices reflect not only all information found in the record of past prices but also all other publicly available information and in strong form of efficiency, the security prices fully reflect all available information, whether available publicly or privately

REVIEW OF LITERATURE

Misra Vandna (2012) tested weak form of efficiency of Indian stock market for the period of 2001-2011. The study offers supportive evidence for rejection of weak form of efficiency in Indian stock market

by endorsing absence of randomness and independence in selected return series. It reveals drifts in market efficiency which offers avenues for devising profitable trading strategies to market participants. **Rajesh Ramkumar1 .R, Selvam M. and Indhumathi .G (2012)** tested the sectoral indices of BSE and to examine the market efficiency by using the Runs Test and Autocorrelation Test. The analysis of different indices facilitates the Government and Investors to use it as the reference guide. The study establish that the returns of BSE Automobile Index, BSE Bankex, BSE Capital Goods Index, BSE Health Care Index, BSE Metal Index, BSE PSU Index and BSE Realty Index were significant at 5% level during the study period.

Victor K. Gimba1 (2010) tested the Weak-form Efficient Market Hypothesis of the NSE by hypothesizing Normal distribution and Random walk of the return series. Daily and weekly Share Index and five most traded and oldest bank stocks of the NSE are examined from January 2007 to December 2009 for the daily data and from June 2005 to December, 2009 for the weekly data. The empirical findings derived from the autocorrelation tests reject the random walk for the market index and four out of the five selected individual stocks. The study found that NSE stock market is inefficient in the weak form. **Anand Pandey (2003)** tested the efficiency level of the three popular stock Indices of Indian Stock Market by using the run test and the autocorrelation function ACF (k) for the period from January 1996 to June 2002. It is found from the Autocorrelation and Runs Test that the time series of stock indices in the Indian Stock Market were bi-ased random time series. The auto correlation analysis indicates that the behavior of share prices does not confirm the applicability of the random walk model in the India stock market. **Ayhan Kapusuzoglu (2013)** probed to examine under Istanbul Stock Exchange (ISE) National 100 index whether weak form market efficiency exists or not under efficiency market hypothesis. The period of the study is 1996 to 2012. The test used for this study unit root tests. it has precipitated that set is stationary at the level (H0 hypothesis rejected). The result determined that the related set not shows random walk and in other words, ISE National 100 market is not an efficient market in weak form. **Nikunj R. Patel, Nitesh Radadia and Juhi Dhawan (2012)** investigated the weak form market efficiency of Asian four selected stock markets by taking daily closing price of stock markets under the study from the 1stJanuary 2000 to 31stMarch 2011 by Appling various test like Runs Test, Unit Root Test, Variance Ratio, Auto Correlation and other test. The Runs Test indicated BSE Sensex and NIKKEI markets are weak form inefficient whereas HANSENG and SSE Composite hold weak form of efficiency. The Autocorrelation indicated inefficient. **Sameer Elbarghouthi, Amer Qasim and Mohammed Yassin (2012)** tested to apply runs test to examine whether ASE is weak form efficient. The empirical results found in this

paper that the price behavior in ASE does not follow the random walk model over time. They suggest that the price behavior in developed markets can be characterized as random walk. The ASE reflects a high degree of positive temporal dependency patterns, violating the assumption of random walk model.

STATEMENT OF PROBLEM

The stock market is flourishing at a very high rate and the number of investors investing in it is also increasing. Besides, the investors do not have any idea about which company and which indices are best in India.

OBJECTIVES OF THE STUDY

- To examine the stationarity of Selected NSE Sectoral Indices
- To determine the randomness of Selected NSE Sectoral Indices
- To analyze the efficiency of Selected NSE Sectoral Indices
- To identify the Volatility of Selected NSE Sectoral Indices

SAMPLE SIZE

The sectors selected are CNX Auto, CNX Bank, CNX Energy, CNX FMCG, CNX IT, CNX Metal and CNX Pharma

SOURCE AND COLLECTION OF DATA

The study mainly depends on secondary data. The required data for the study is daily closing price of NSE Sectoral Indices .Data was collected from www.nseindia.com.

PERIOD OF THE STUDY

The study has done for five years from 1st April 2009 to 31st March 2014

TOOLS FOR ANALYSIS

- Descriptive Statistics
- Unit Root test : ADF & PP Test
- Runs Test
- Autocorrelation Test
- TGarch

HYPOTHESIS OF THE STUDY

In an attempt to study the weak form efficiency of NSE Sectoral Indices the following hypothesis framed

- H₀₁ : There is no stationary in the returns of NSE Sectoral Indices
- H₀₂ : There is randomness in the returns of NSE Sectoral Indices
- H₀₃ : There is weak form efficiency in the returns of NSE Sectoral Indices

ANALYSIS AND INTERPRETATION OF NSE SECTORAL INDICES

1, Analysis of Descriptive Statistics for NSE Sectoral Indices

S. No.	Sectoral NSE Indices	Mean	S.D.	Skewness	Kurtosis
1	CNX Auto Index	0.001273	0.014199	1.054860	13.19293
2	CNX Bank Index	0.001050	0.018049	1.061039	13.32923
3	CNX Energy Index	0.000100	0.0166997	0.360774	14.15134
4	CNX FMCG Index	0.001081	0.011602	0.401804	6.878908
5	CNX IT Index	0.001215	0.015580	0.144134	13.25634
6	CNX Metal Index	0.000492	0.019349	0.788799	9.296704
7	CNX Pharma Index	0.001062	0.830577	0.830577	18.22087

Table 1 shows the descriptive statistics of CNX Auto Companies and CNX Auto Index for 1st April 2009 to 31st March 2014. The mean values of NSE Sectoral Indices are indicating positive during the study period from 1st April 2009 to 31st March 2014. The standard deviations of NSE Sectoral Indices are positive and which are plotted normally from the

mean. The positive (Right Skewed Distribution) Skewness value of the NSE Sectoral Indices indicates that there is high probability of getting positive returns. According to the analysis of Kurtosis, it is to be noted that its value for NSE Sectoral Indices is more than 3. **This result indicates that the distribution of return did not follow normal distribution for NSE Sectoral Indices during the study period.**

2, Analysis of ADF Test and PP Test for NSE Sectoral Indices

	TEST STATISTIC	ADF Test	P-P TEST
NSE Sectoral Indices	SIGNIFICANT LEVEL	LEVEL DIFFERENCE	LEVEL DIFFERENCE
CNX Auto Index	Test Statistic	-31.76412	-31.69016
Test Critical Values	1% Level	-3.435390	-3.435390
	5% Level	-2.863653	-2.863653
	10% Level	-2.567945	-2.567945
CNX Bank Index	Test Statistic	-30.94253	-30.77283
Test Critical Values	1% Level	-3.435390	-3.435390
	5% Level	-2.863653	-2.863653
	10% Level	-2.567945	-2.567945
CNX Energy Index	Test Statistic	-36.88082	-36.84674
Test Critical Values	1% Level	-3.434537	-3.434537
	5% Level	-2.863276	-2.863276
	10% Level	-2.567743	-2.567743
CNX FMCG Index	Test Statistic	-35.64428	-35.67810
Test Critical Values	1% Level	-3.435390	-3.435390
	5% Level	-2.863653	-2.863653
	10% Level	-2.567945	-2.567945
CNX IT Index	Test Statistic	-34.95013	-34.95128
Test Critical Values	1% Level	-3.435390	-3.435390
	5% Level	-2.863653	-2.863653
	10% Level	-2.567945	-2.567945
CNX Metal Index	Test Statistic	-33.17073	-33.16580
Test Critical Values	1% Level	-3.435390	-3.435390
	5% Level	-2.863653	-2.863653
	10% Level	-2.567945	-2.567945
CNX Pharma Index	Test Statistic	-35.24296	-35.24296
Test Critical Values	1% Level	-3.435390	-3.435390
	5% Level	-2.863653	-2.863653
	10% Level	-2.567945	-2.567945

Table 2 presents the ADF test and PP test of NSE Sectoral Indices. It is to be noted that the values of test critical for NSE Sectoral Indices were calculated at three type of significant level 1%, 5% and 10%. The probability value for NSE Sectoral Indices is zero. It is important to note there that the statistical values for NSE Sectoral Indices were less than that of test critical values at 1%, 5% and 10% level of significance. The overall analysis of the ADF Test and P-P Test clearly shows that there is stationary in the returns data of NSE Sectoral Indices. Hence, the Null Hypothesis (NH1), namely, **“There is no stationary in the returns of NSE Sectoral Indices”**, is rejected.

3, Analysis of Selected Runs Test for Selected NSE Sectoral Indices

Sectoral NSE Indices	No of Observations	No of Runs	Z value	Significant value
CNX Auto Index	1246	591	-1.871	.061
CNX Bank Index	1246	588	-2.0441	.041
CNX Energy Index	1246	767	1.115	.265
CNX FMCG Index	1246	619	-.283	.777
CNX IT Index	1246	595	-1.644	.100
CNX Metal Index	1246	597	-1.530	.126
CNX Pharma Index	1246	594	-1.700	.089

Table 3 presents the runs test of Selected NSE Sectoral Indices. The analysis of z-value of NSE Sectoral Indices except CNX Bank Index fall down in-between the value of ± 1.96 and CNX Bank Index its crossed upon the table value of ± 1.96 . NSE Sectoral Indices except CNX Bank shows that successive price changes are independent and there by supporting the assertion of random and CNX Bank Index shows that the successive price changes are dependent and thereby not supporting the assertion of random. The overall analysis of Runs Test clearly shows that the CNX Bank Index not followed the random distribution and other Index followed the random distribution. Therefore, the Null Hypothesis (NH2), namely, **"There is randomness in the returns of NSE Sectoral Indices except CNX Bank Index"** is accepted.

4, Analysis of Autocorrelation for Selected NSE Sectoral Indices

Lags	CNX Auto Index	CNX Bank Index	CNX Energy Index	CNX FMCG Index	CNX IT Index	CNX Metal Index	CNX Pharma
1	0.105	.133	.044	-.011	.012	.065	.001
2	0.038	-.041	-.013	-.025	-.043	.031	-.036
3	-0.064	-.021	-.038	-.056	-.020	-.007	-.046
4	-0.024	.031	-.024	.000	.066	-.033	.010
5	-0.018	-.034	-.022	.037	.004	-.026	-.030
6	0.002	-.029	-.052	.008	-.002	-.047	-.027
7	0.087	.026	.042	.040	-.012	.072	.070
8	-0.014	-.003	.047	-.033	-.003	.053	.001
9	0.005	.024	.026	.002	.015	.082	.011
10	0.033	.003	-.018	-.002	.028	.028	.016
11	0.002	.000	.001	-.029	-.012	.006	.026
12	0.026	.027	.003	.034	-.004	.011	-.006
13	-0.013	-.016	.034	.006	-.034	-.052	.064
14	0.014	.012	.076	.009	-.024	-.001	.054
15	0.012	.054	-.002	-.069	.044	.003	-.080
16	-0.042	.032	.005	-.054	.013	.003	-.050
17	0.020	.025	.029	.047	.056	.065	.001
18	0.010	.016	-.071	-.050	.026	.031	-.036
19	0.025	-.027	-.009	-.024	.032	-.007	-.046
20	-0.033	-.015	-.086	.008	.006	-.033	.010

Table 4 presents the Autocorrelation of NSE Sectoral Indices. It is to be distinguished that there were a total of 20 lags during the study period. The NSE Sectoral Indices taken for this study included CNX Auto, CNX Bank Index, CNX Energy Index, CNX FMCG Index, CNX IT Index, CNX Metal Index and CNX Pharma Index. From the overall analysis of the returns of Sectoral Indices, it is clear that CNX Metal Index had more number of lags with positive autocorrelation value whereas the remaining CNX Index recorded low number of lags with positive significant during the study period. Hence the Null Hypothesis **"There is no weak form efficiency in the returns of Sectoral Indices"** is accepted.

5, Analysis of TGARCH for Selected Sectoral Indices

S. No	NSE Sectoral Indices	Coefficients - TGARCH (1,1)				AIC	Log Likelihood
		α_0	α_1	δ	β_1		
1	CNX Auto Index	5.94E-07 (1.818934)	0.003825 (1.984356)	0.038736 (5.813413)	0.974645 (266.0865)	-5.808631	3622.777
2	CNX Bank Index	2.33E-06 (3.473199)	0.012391 (1.983506)	0.054135 (5.561438)	0.953597 (115.5939)	-5.380911	3356.308
3	CNX Energy Index	1.67E-06 (3.077236)	0.037992 (3.462578)	0.050992 (3.806787)	0.932875 (94.26492)	-5.681749	4234.062
4	CNX FMCG Index	2.34E-06 (4.441359)	0.038820 (4.041198)	0.017693 (1.258436)	0.933662 (104.1245)	-6.183981	3856.620
5	CNX IT Index	3.36E-05 (9.483395)	0.160338 (10.26678)	-0.024683 (-0.848269)	0.720249 (29.14502)	-5.583451	3482.490
6	CNX Pharma Index	3.24E-06 (2.630601)	0.019426 (2.717265)	0.069681 (4.777614)	0.935628 (77.20648)	-5.262397	3282.473
7	CNX Metal Index	8.58E-07 (4.818922)	0.015014 (3.664103)	0.002245 (0.360007)	0.972893 (317.9350)	-6.430230	4010.034

α_0 : constant in the model represents a long-run average;

α_1 : The ARCH term which is the lag of the squared residuals from the mean equation, represents news about Volatility from the previous period;

β_1 : The GARCH term is the last period's forecast variance

δ - Takes the value of 1 if ϵ_j is negative, and 0 otherwise, identifying "good news" and "bad news" have a different impact.

Table 5 shows that TGARCH model for selected Sectoral Indices. The best fitted model selection criteria are found out of higher value of Log-L value and lower AIC value for the Sectoral Indices. From the above estimated results the lower AIC values are presented in TGARCH (1,1). The work further proceeds to go with the above said model.

To find out the asymmetries in terms of positive and negative implications for Sectoral Indices and the GARCH effect is significant for Sectoral Indices. The results thus suggest that positive shocks are observed for NSE Sectoral indices except CNX FMCG Index and CNX Metal Index at five per cent level of significant through the asymmetries δ value. This clearly indicates the movement to asymmetrical reaction of Sectoral Indices except CNX FMCG Index and CNX Metal Index towards the good and bad news of the market. On the other hand, the coefficient for asymmetries δ values are insignificant for CNX FMCG Index and CNX Metal Index. The insignificant results concluded that there is no presence of asymmetries effect for the above said Index

CONCLUSION

The study investigates the weak form efficiency in National Stock Ex-

change Sectoral Indices. The Descriptive Test, ADF and PPT Test, Runs Test, Autocorrelation Test and TGarch applied to test the weak form efficiency in NSE Sectoral Indices. According to the Autocorrelation all the indices are not efficient. The study concludes that NSE Sectoral Indices is not weak form efficient. The information regarding yesterday's and today's indices can be used to predict tomorrow's indices. It means investors can identify available undervalued securities in the market make excess returns by correctly picking them.

REFERENCES

- Misra Vandna, Mishra Amit Kumar and Rastogi Sanjay, (2012), "Testing Efficient Capital Market Model in Indian Sub-Continent", *GF Journal Management and Research*, 5(2), pp. 1-14 |
- Rajesh Ramkumar1, R. Selvam M. and Indhumathi, G. (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), pp. 290-297 |
- Victor K. Gimba1, (2010), "Testing the Weak-form Efficiency Market Hypothesis: Evidence from Nigerian Stock Market", *CBN Journal of Applied Statistics*, 3(1), pp. 117-136. |
- Anand Pandey, A. (2003), "Efficiency of Indian stock market", Available at SSRN 474921. |
- Ayhan Kapusuzoglu, (2013), "Testing Weak Form Market Efficiency on the Istanbul Stock Exchange (ISE)", *International Journal of Business Management and Economic Research*, 4(2), pp. 700-705. |
- Nikunj R. Patel, Bhavesh K. Patel and Darshan Ranpura, (2004), "Testing Weak Form Market Efficiency of Indian Stock Markets", *International Journal of Business And Management Research*, 1(3), pp.1-28. |
- Sameer Elbarghouthi, Amer Qasim, Mohammed Yassin, (2012), "The Use of Runs Test in Amman Stock Exchange", *International Business Research*, 5(2), pp. 159-172. |