FORECASTING INDEX MOVEMENTS: A STUDY WITH REFERENCE TO SELECTED NSE SECTORAL INDICES.

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Abstract

The present study is to forecast Index Movement of selected samples indices listed in NSE. For the purpose of analysis, four important sectoral indices namely NSE Auto, NSE FMCG, NSE IT and NSE Pharma were selected, using descriptive statistics, Stationarity Test, Normality Test, Volatility Test and Rescaled Range Analysis for forecasting of Index Movements.. The daily index prices of the selected sample were collected from the official NSE website (www.nseindia.com). The period of study was 12 years from 1st April 2005 to 31st March 2017, From the analysis it is concluded that Information flow determines the intensity of returns for Investors. Hence careful evaluation of market information and its sensitivity can help investors retains and earn higher returns in stock markets.

Keywords: Normality Test, Volatility Test, Rescaled Range Analysis, Index Movements, NSE.

1. Introduction

It is an art of trying to determine the future value of the stock market or other financial instrument traded on a stock exchange. The successful stock market prediction will reveal the increase and extra earnings of the share. Generally, the Efficient Market Hypothesis, Fundamental Analysis, Technical Analysis and Internet - based data Sources are used for analyzing the share price movements and prediction of share return.

1.1 Fundamental Analysis

Fundamental analysis is really a logical and systematic approach to estimate the future share price. It is based on the basic premise that share price is determined by a number of fundamental factors relating to Economy, Industry, and Company. Each share is assumed to have an economic worth based on its present and future earnings capacity. The purpose of the fundamental analysis is to evaluate the present and future earnings capacity of a share based on economy, industry and company fundamentals and thereby assess the fundamental value of the share. It comprises of the following a) Economic Analysis B) Industry Analysis C) Company Analysis.

1.2 Technical Analysis

The Technical Analysis is based on the premise that share prices are determined by the demand and supply forces operating in the market. These demand and supply forces, in turn, are influenced by a number of fundamentals factors as well as certain psychological or emotional factors. The combined impact of all these factors is reflected in the share price movements. The basic premise of technical analysis is that prices move in trends or waves which may be upward or downward. It is believed that the present trends are influenced by the past trends and that the projection of future trends is possible by an analysis of past price trends. The technical analysis is really a study of past or historical price and volume movements so as to predict the future stock price behavior.

2   Review of Literature

The following are the different studies undertaken in the different period to predict the stock market, using other tools which were used for Stock price prediction.

"**Rescaled Range Analysis and De-trended Fluctuation Analysis: Finite sample properties and Confidence Intervals** " by LadislavKristoufek (2010), found that the presence of R/S were significantly higher than an asymptotic limit of 0.5 of random time series, using Hurst exponent H Estimation – Rescaled range analysis and de-trended fluctuation analysis on different types of financial assets.

The findings indicated the R/S was useful and robust method when compared to newer method of DFA.

"**A Measure of persistence in daily Pound Exchange Rates",** by Brooks. C (2010), identified the persistence in time series, using Hurst exponent and Rescaled range analysis of ten daily pound exchange rates for 5191 observations. The findings indicated that there was a lack of long term memory in the exchange rates.

"Rescaled Range Analysis of the stock market returns", by PrashantaKharel (2010), analyzed the long memory effects, fractal statistic structure of stock market returns using Re-Scale Range Analysis. The findings indicated that Rescaled range analysis and the values of Hurst exponents for the markets revealed that the market have persistence, bias and demonstrated long memory effects.

"An Analysis of Presence of Long memory in the Indian Foreign Exchange Market" by Anoop S Kumar (2011), identified the presence of long memory in the Indian Foreign Exchange Rate (NEER), using R/S Statistics, Robinson's Gaussian Semi parametric estimate and Andrews- Guggeenberger modified GPH Estimator for the period of 207 days. The findings indicated the presence of strong version of long memory in the Indian Foreign Exchange market..

In the paper, **"Using the GARCH Model to analyze and predict the different stock markets"** by Wei Jiang and Lars Forsberg (2012), introduced several volatility models and predicted the conditional variance about the rate of return in different markets, during the study period 1st April 2007 to 31st March 2011 using GARCH, E – GARCH and GJR GARCH model, for five global stock market indexes NASDAQ's, Standard and Poor's 500, FTSE100, HANG SENG and NIKKEI daily index. The findings indicated that the GJR – GARCH and GARCH (1.1) model predict the future conditional variance better than other models.

"Modeling and Volatility Analysis of Share price Using ARCH and GARCH Models", by Sohail Chand, Shahidkamal and Imran Ali (2012), analyzed the mean and variance components of the daily closing price using

ARIMA- GARCH, during the study period 1ˢᵗ April 2005 to 31ˢᵗ March 2008, using Augmented Dickey-Fuller Test . It was found that the GARCH (1,1) model is the superior fit for forecasting the daily closing share prices.

LadislavKristoufek (2012), in the paper entitled **"How are Re-scaled Range Analyses affected by different memory and distributional properties? A Monte Carlo Study"** analyzed the effect of different distributional properties and the ability of the methods to efficiently distinguish between short term and long term memory, using classical and modified R/S analysis, ARFIMA and Monte Carlo simulation Techniques. It was concluded that the R/S exhibited biased results upwards for short range dependent process and M-R/S exhibited strong biased results downwards for long range dependency.

Using Range to Standard Deviation Ratio and De-trended Fluctuation analysis, Mitra. S.K (2012), in the paper entitled **"Is Hurst Exponent Value useful in forecasting Time Series?"** measured Hurst Exponent of twelve Stock Index series from across the globe using daily values for ten years for market efficiency. The findings indicated that the Hurst exponent value was found to vary widely when the full series were splitted into smaller series of 60 trading days.

In the paper **"Fractal Analysis of Time series and Distribution Properties of Hurst Exponent",** Malhar Kale and Ferry Butar (2012), analyzed the randomness of time series in terms of persistency or anti persistency process, using rescaled range analysis of Hurst exponent and fractal dimension. It was found that time series data randomly generated from a normal distribution then the estimated Hurst Exponent, because the standard deviations of R/S are less than the DFA.

Using One Dimensional R/S Method, Two Dimensional R/S Method and Higher Dimension R/S Method, Jie Fan (2013), in the paper entitled **"Rescaled Range Analysis in Higher Dimensions"** measured the long range correlations and the presence of periodical features of a time series which were observed on the Renmin Road of Handan, for the period of 6ᵗʰ December 2011 to 2ⁿᵈ January 2012. The findings indicated that the higher dimensions R/S algorithm provided quantitative insight into the intrinsic correlations of higher dimensional time series.

Annette Witt Bruce D. Malamud (2013), in the paper entitled **"Quantification of Long Range Persistence in Geophysical Time Series: Conventional and Benchmark- Based Improvement Techniques "** analyzed the time series on the Earth Sciences, using Hurst R/S analysis , Semi variogram analysis , De-trended fluctuation analysis and Spectral Techniques. It was concluded that the strength of long range persistence of a time series, benchmark – based improvements to the estimator predicted the performance for self affine noise with the same time series length. .

Using ARCH and PARCH model, ZahangirAlam, NomanSiddikee and Masukujjaman (2013), in the paper entitled **"Forecasting Volatility of Stock Indices with ARCH Model"**analyzed the use of ARCH model for forecasting volatility of the DSE20 and DSE general indices, during the period 1st December 2001to 10th September 2011, using GARCH, ARCH, EGARCH, PARCH and TARCH. The findings indicated that all the models except GARCH and TARCH models are considered as the best model jointly for DSE20 and DSE general indices return series.

Arowolo W.B (2013), in the article, **"Predicting Stock Prices Returns Using GARCH Model"** investigated the forecasting properties of linear GARCH model for daily closing prices of Zenith Bank Plc in Nigeria Stock Exchanges, during the study period 20th April 2005 to 30th December 2009, using ARCH, GARCH. The findings indicated that GARCH model was identified to be the most appropriate for the time-varying volatility of the data.

Using Mono Fractal Analysis, Multi Fractal Analysis and Empirical Analysis, Yi Wang, Xin Su and Xueil Zhen (2015), in the paper entitled **"Fractal Analysis of the Agricultural Products Price Time Series"** measured the predictability of wholesale price of agricultural product for the period of February 2003 to May 2014 which comprised of 594 weeks. The findings indicated that the price exhibited mono fractal and multi fractal method of prediction and risk assessment for agricultural products.

"**ARIMA / GARCH (1,1) Modeling and Forecasting for a GE Stock Price Using R",** by Varun Milk (2017), developed an understanding of the time series analysis, modeling and forecasting performance using ARIMA, GARCH (1,1) and R during the study period 2001 to 2014. It is found that ARIMA and GARCH (1,1) model is applied to observe the forecasting values of low and high stock price in (USD) for GE company.

3 Research Design

The present study considered selected sectoral Indices listed in National Stock Exchange of India to analyze the behavior of Index prices using Descriptive Statistics, Augmented Dickey Fuller Test Phillips Perron Test for Stationarity , Normality test using Kolmogorov- Smirnov and Shapiro –Wilk Test, Volatility Test using ARCH and GARCH model and Rescaled Range analysis during the study period 01st April 2005 to 31st March 2017 to assess the index price prediction using Rescaled Range Analysis for selected sectoral sample return listed National Stock Exchange of India Ltd.

The study is different from earlier studies in the way that Sectoral Indices listed in National Stock Exchange of India namely NSE Auto, NSE FMCG, NST IT and NSE Pharma were taken into consideration for the present study during the period 01st April 2005 to 31st March 2017. The Index price prediction is an art of trying to determine the future value of the stock market or other financial instrument traded on the stock exchange. The successful stock market prediction will reveal the increase and extra earnings of the share. Generally, a change occurs in the price of the stock only because of certain changes in the economy, industry or company. Information about these changes alters the stock prices immediately and stock moves to a new level, upwards or downwards, depending on the types of information.

3.1 Statement of the problem

The basic premise in random walk theory is that the information on changes in the economy, industry and company performance is immediately and fully spread so that all investors have full knowledge of the information. The price of

each day is independent. It may be unchanged, higher or lower from the previous price, but that depends on new pieces of information being received in each day.

Fundamentalists believe that it may take several days or weeks before investors can fully assess the impact of new information. As a consequence, the price may be volatile for a number of days before it's adjusted to a new level. This provides an opportunity to the analyst who is superior analytical to earn excess returns.

The efficient market theory holds the view that in an efficient market, new information is processed and evaluated as it arrives and prices instantaneously adjust to the new and correct level. An investor cannot consistently earn excess returns by undertaking the fundamental and technical analysis.

It is to be noted that the different forms of stock price prediction using Artificial Neural Network have been tested through several methods. While analyzing the previous work related to the present study, the following points were noted Varun Milk (2017) during the study period 2001 to 2014, JaydipSen and TamalDattaChaudhuri (2016), during the study period 2010 to 2015, Veerangna Singh (2017) 7th August to 7th November 2016) and post demonetization period(8th November 2016 to 8th February 2018), SerpilTurkyilmaz and MesutBalibey (2014) etc., The results found that artificial neural networks and regression results are consistent with, but the results demonstrate the advantages and effectiveness of the neural network method than regression in predicting stock prices.

The studies analyzed the stock price prediction using Rescaled Range Analysis from different Stock exchanges. Taking into account, the above analysis, the present study considered the Stock Market Prediction using Rescaled Range with special reference to selected Sectoral Indices listed National Stock Exchange in India (NSE) for analyzing the Share price prediction using Descriptive statistics, Augmented Dickey Fuller Test, Phillips Perron Test for Stationarity, Autocorrelation, Normality test using Kolmogorov- Smirnov and Shapiro –Wilk Test, ARCH and GARCH model and Rescaled Range Analysis during the study period 01st April 2005 to 31st March 2017 selected Sectoral Indices listed in National Stock Exchanges. Generally, a change occurs in the price of the stock only because of certain changes in the economy, industry or company. Information

about these changes alters the stock prices immediately and stock moves to a new level, either upwards or downwards, depending on the type of information. Therefore, it becomes necessary to evaluate the share price returns from time - to - time.

3.2 Need for the Study

The present study is based on the stock market prediction of selected sample sectoral indices listed National Stock Exchange of India. This study will help the investors to assess how the current prices of stock already fully reflect all the information that is contained in the historical sequence of prices. Generally, the Efficient Market Hypothesis, Fundamental Analysis, Technical Analysis and Internet-based data sources are used for analyzing the share price movements and prediction of share return.

The stock brokers and stock market mediators who deal in stock market trading can use the fundamental analysis (Intrinsic Value), Technical analysis (Study of Charts), Traditional Times series Forecasting (Linear Prediction Model and Regression model) and Machine Learning method (Linear and Non linear model) to predict the share price and advice their clients and shareholders to get good returns.

Prediction of the stock market index is an important issue in the financial sector, generally Fractal Dimension can effectively be used to predict the stock prices in the stock market and this gives profitability opportunities to the investors and financial analysts.

Investors in stock exchange need to maximize their profit by buying and selling of securities at an appropriate time. Stock market index nonlinear pattern, so predicting the future prices of the shares is highly difficult.

Forecasting of stock market index gains more attention as the key factors of investors in the stock market mainly is profitability, if the direction of the stock price is successfully predicted the investors can yield enough profit out of stock market using various stock prediction model.

3.3 Objectives of the study

1. To assess the normality of selected samples Indices listed in Bombay Stock Exchange of India Ltd and National Stock Exchange of India.
2. To analyze the stationarity of the daily returns of selected sectoral Indices listed in Bombay Stock Exchange of India ltd and National Stock Exchange of India.
3. To test the Volatility of the returns of selected sectoral Indices listed in Bombay Stock Exchange of India Ltd and National Stock Exchange of India.
4. To analyze and compare the real data with predicted movements of stock returns using Rescaled Range Analysis.

3.4 Null Hypotheses of the study

H01: There is no normality in the daily index returns of selected Sectoral Indices listed in National Stock Exchange of India (NSE) during the Study period.

H02: There is no stationarity in the daily returns of selected Sectoral Indices listed in National Stock Exchange of India (NSE) during the study period.

H03: The volatility in thedaily index returns of selected Sectoral Indices listed in National Stock Exchange of India (NSE) is not significant during the study period.

H04: The daily index returns of selected Sectoral Indices listed in National Stock Exchange of India (NSE) are no long range dependence during the study period

3.5 Methodology of the Study

3.5.1   Sample Selection

Stock Exchange makes available stock market indices, which are useful in understanding the level of prices and the trend of the price movements of the market as a whole. Stock markets indices are meant to capture the overall behavior of equity shares. A market index is formed by considering the performance of the group of stocks which represents the whole market or sector.

The following Sectoral Indices were selected for the study

Table 3.1 Constituents of Selected National Stock Exchange of India Ltd – NSE Sector & Industry Indices

NSE Indices	Meaning	No of Constituents	Launch Date
NIFTY AUTO	The Automobile manufacturing firms listed in NSE are evaluated based on the market capitalization which forms the NSE Nifty Auto.	16	12th July – 2011/01st January-2000.
NIFTY FMCG	The Nifty FMCG Index is designed to reflect the behaviour and performance of Fast Moving Consumer Good's which are non – durable, Mass Consumption products and available off the shelf.	10	22nd September – 1999/01st January -1996.
NIFTY IT	The Nifty IT Index captures the performance of Indian IT Companies.	10	01st January-1996.
NIFTY PHARMA	Nifty Pharma Index captures the performance of the Pharmaceutical sector.	10	01st July-2005/01st January-2001.

Sources: Data Collected from www.nseindia.com as on 27th October – 2017.

3.5.2 Sources of Data

The data for the present study was collected through secondary data. The daily Index price of selected sectoral Indices listed in National Stock Exchange of India data were taken from official website NSE (www.nseindia.com). Other relevant data were collected from various Books, Journals, and online sources.

3.5.3 Period of Study

The present study is an attempt to find the stock market prediction using Rescaled Range Analysis of selected Sectoral Indices listed in National Stock Exchange of India during the study period of 12 years from 1st April 2005 to 31st March 2017.

3.5.4 Tools used for Analysis

The following statistical tools were used for the analysis of the returns and stock prediction for the selected sample during the study period from 1st April 2005 to 31st March 2017

Table 3.2 Tools used for Analysis

S. No	Statistical Tools	Meaning
1	Return	To convert the daily closing price of the selected Indices into logarithmic returns
2	Mean	It used to measure for representing the entire data by one value called an average.
3	Standard Deviation	It is a measure of how much "Spread" or "variability" is present in the sample.
4	Skewness	When a distribution is not symmetrical it is called a skewed distribution. It is said to be positive (Mean < Mode) or negative Distribution (mode < mean).
5	Kurtosis	It refers to the degree of flatness or peakedness in the region about the mode of frequency curve.
6	Normality Test (Kolmogorov-Smirnov and Shapiro –Wilk)	A normality test is used to determine whether sample data has been drawn from a normally distributed population (within some tolerance).
7	Stationarity test (using ADF and PP)	If trend persists, prediction is not possible, data convert trend data to stationarity data. In simple trend data convert into times series data.
8	Volatility Test	Volatility refers to the amount of uncertainty or risk about the size of changes in a security's value. A higher volatility means

		that a security's value can potentially be spread out over a larger range of values. A lower volatility means that a security's value does not fluctuate dramatically, but changes in value at a steady pace over a period of time.
9.	Rescaled Range Analysis	It is a statistical techniques designed to assess the nature and magnitude of variability in data over a times. It has been used to detect and evaluate the amount of persistence, randomness or mean revision in financial market time's series data.

3.5.5 Limitations of the Study

❖ The data for the present study was based only on Secondary source and as such, all the limitations of a secondary source of data applies to the study also.

❖ The duration of the study period is restricted to twelve years from 1st April 2005 to 31st March 2017.

❖ While Calculating Descriptive, Normality, Stationarity and Volatility, only closing index returns are considered.

❖ The limitations of all statistical tools namely, Summary Statistics, Augmented Dickey-Fuller and Phillips-Perron, Kolmogorov-Smirnov and Shapiro-Wilk, Autoregressive Conditionally Heteroskedasticity (ARCH) Model, Generalized Autoregressive Conditionally Heteroskedasticity (GARCH) Model and NARX Model using Regression Plot are applicable to the present study.

4   Data Analysis & Discussion

Table 4.1 Results of Summary Statistics of Selected Sample Indices during the Study period 1ˢᵗ April 2005 to 31ˢᵗ March 2017.

Particulars	NSE AUTO	NSE FMCG	NSE IT	NSE PHARMA
Mean	-0.998927	-0.998951	-0.999231	-0.999088
Maximum	0.00000	0.000000	0.000000	0.000000
Minimum	-1.103149	-1.085131	-1.124903	-1.086336
Standard Deviation	0.023559	0.022598	0.024812	0.022152
Skewness	25.54556	28.95476	21.88166	30.72171
Kurtosis	1087.353	1283.81	885.4724	1391.189

Source: Data collected from www.nseindia.com **and computed using E-views.**

Table 4.1 shows the results of Descriptive statistics of NSE Auto, NSE FMCG, NSE Information System and NSE Pharma during the study period 1ˢᵗ April 2005 to 31ˢᵗ March 2017. The Minimum and Maximum values of selected sample ranged between – 0.999 for all the selected Sectoral Indices. The average returns of selected sample were -0.99 which indicates that the investors of selected sample earned negative returns during the study period. It is to be noted that the standard deviation value of NSE Auto, NSE FMCG, NSE IT and NSE Pharma found to be ranged between .022 to 0.024 respectively, which indicates a low volatility. With respect to the data distribution, a positive skewness with a value of 30.72 NSE Pharma was recorded. The Kurtosis which measures, the peakedness of the data distribution was found to be greater than three i.e 1087.35 (NSE Auto), 1283.81 (NSE FMCG), 885.47 (NSE IT) and 1391.18 (NSE Pharma) which indicated Leptokurtic distribution.

Table 4.2 Summary Results of Normality Test using Kolmogorov- Smirnov and Shapiro – Wilk Statistic of Sample Indices during the study period 1st April 2005 to 31st March 2017.

Tests of Normality						
	Kolmogorov-Smirnov			Shapiro-Wilk		
Particulars	Statistic	df	Sig.	Statistic	Df	Sig.
NSE AUTO	0.145	2978	<0.001	0.445	2978	<0.001
NSE FMCG	0.163	2978	<0.001	0.395	2978	<0.001
NSE IT	0.146	2978	<0.001	0.494	2978	<0.001
NSE PHARMA	0.177	2978	<0.001	0.362	2978	<0.001

Source: Data Collected from www.nseindia,com **and Computed Using SPSS.**

The results of normality analysis using Kolmogorov-Smirnov and Shapiro-Wilk Test Statistic for NSE Auto, NSE FMCG, NSE IT and NSE Pharma during the study period 01st April 2005 to 31st March 2017 are presented in **Table 4.2.** It is to be noted that the Kolmogorov-Smirnov Statistic was found to be 0.145,0.163,0146,0.177 and Shapiro-Wilk Statistic was .0445,.0395,0.494,0.362 for NSE Auto, NSE FMCG. NSE IT and NSE Pharma respectively, during the study period. With respect to the 'p' value, both statistics recorded statistically significant 'p' value at 5% level. Hence the H01: **"There is no normality in the daily index returns of selected sample"** is rejected. Therefore it becomes evident that NSE Auto, NSE FMCG. NSE IT and NSE Pharma witnessed normality of data distribution during the study period.

Table 4.3 Summary Results of Stationarity test using Augmented Dickey Fuller Statistic and Phillips-Perron Statistic of Sample Indices during the study period 1st April 2005 to 31st March 2017.

Stationarity test						
Particulars	**ADF**	**PP**	**1% Level**	**5% Level**	**10% Level**	**Sig.**
NSE AUTO	-29.9132	-29.606	-3.43236	-2.86231	-2.56723	<0.001
NSE FMCG	-31.5306	-30.8524	-3.43236	-2.86231	-2.56723	<0.001
NSE IT	-35.9673	-35.1746	-3.43236	-2.86231	-2.56723	<0.001
NSE PHARMA	-29.0398	-29.1648	-3.43236	-2.86231	-2.56723	<0.001
*MacKinnon (1996) one-sided p-values.						

Source: Data collected from www.bseindia.com **and Computed using E-views**

Table 4.3 shows the results of Stationarity test using Augmented Dickey Fuller (ADF) and Phillips – Perron (PP) statistics for NSE Auto, NSE FMCG. NSE IT and NSE Pharma during the study period 1st April 2005 to 31st March 2017. The Augmented Dickey Filler -29.9132, -31.5306, -35.9673 , -29.0398 and Phillips Perron -29.606, -30.8524, 35.1746, 29.1648 (Ignoring the Sign) for NSE Auto, NSE FMCG. NSE IT and NSE Pharma respectively, was greater than Test critical values at 1% level (-3.43236), 5% level (-2.86231) and 10% level (-2.56723) for selected returns of for NSE Auto, NSE FMCG. NSE IT and NSE Pharma at level range. Further, the Prob Value was less than 0.05 for the selected sample return of for NSE Auto, NSE FMCG. NSE IT and NSE Pharma (0.000). Hence the **H02: "There is no stationarity in the daily shares price return of Selected Indices"** is rejected. Therefore the for NSE Auto, NSE FMCG. NSE IT and NSE Pharma confirmed stationarity at level difference. As for NSE Auto, NSE FMCG. NSE IT and NSE Pharma attained stationarity at level difference, it is not necessary to go for first level and second level difference.

Table 4.4 Volatility Analysis using GARCH (1,1) Model for Selected Sample Indices1ˢᵗ April 2005 to 31ˢᵗ March 2017.

Tests of Volatility									
Particulars	**Var**	**Mean Equation**			**Variance Equation**				
		Coefficient	**Std. Error**	**Z - Statis**	**Variable**	**Coefficient**	**Std. Error**	**z-Stati**	**Prob.**
NSE AUTO	C	**-0.998**	0.0002	-3640.88	C	**1.23E-07**	3.05E-08	4.04421	0.001
					ARCH(1)	**-0.00067**	9.24E-05	-7.25923	
					GARCH(1)	**1.000823**	3.83E-05	26154.9	
NSE FMCG	C	**-0.999**	0.0002	-3533.87	C	**5.43E-07**	5.72E-08	9.49503	0.001
					ARCH(1)	**-0.001243**	0.000179	-6.95083	
					GARCH(1)	**0.999557**	7.80E-05	12818.2	
NSE IT	C	**-0.999**	0.0003	-2779.18	C	**4.82E-07**	6.97E-08	6.92317	00.001
					ARCH(1)	**-0.00062**	9.75E-05	-6.36362	
					GARCH(1)	**0.999692**	0.0001	9979.12	
NSE PHARMA	C	**-0.999**	0.0002	-4018.54	C	**2.96E-07**	2.69E-08	11.003	0.001
					ARCH(1)	**-0.000851**	0.000105	-8.08789	
					GARCH(1)	**0.999975**	4.09E-05	24475.94	

Source: Data Collected from www.nseindia,com , computed using Eviews.

Table 4.4 presents the results of the mean and variance Equation of GARCH model for for NSE Auto, NSE FMCG. NSE IT and NSE Pharma daily returns from 1st April 2005 to 31st March 2017. It is to be noted that 'C' represent constant. The findings indicates that the mean equation co efficient was negative (-0.999) and significant at 5% level for for NSE Auto, NSE FMCG. NSE IT and NSE Pharma. The variance equation coefficient of ARCH (1) for NSE Auto, NSE FMCG. NSE IT and NSE Pharma returns were close to Zero (0.000) and The variance equation coefficient of GARCH (1) for NSE Auto, NSE FMCG. NSE IT and NSE Pharma returns were close to one (0.999) . The coefficient of GARCH is closer to one and ARCH (1) parameter was less than Zero. It is found from the above analysis that the volatility was highly persistent. Hence the **H03:** "**There is no significant Volatility in the selected sample return",** is rejected.

4.5 Rescaled RangeAnalysis Results for selected sample S&P NSE Sectoral Indices during the study period 1st April 2005 to 31st March 2017.

R/S Chart 4.1 for S&P NSE Auto, FMCG, IT and Phrama during the study period 1st April 2005 to 31st March 2017.
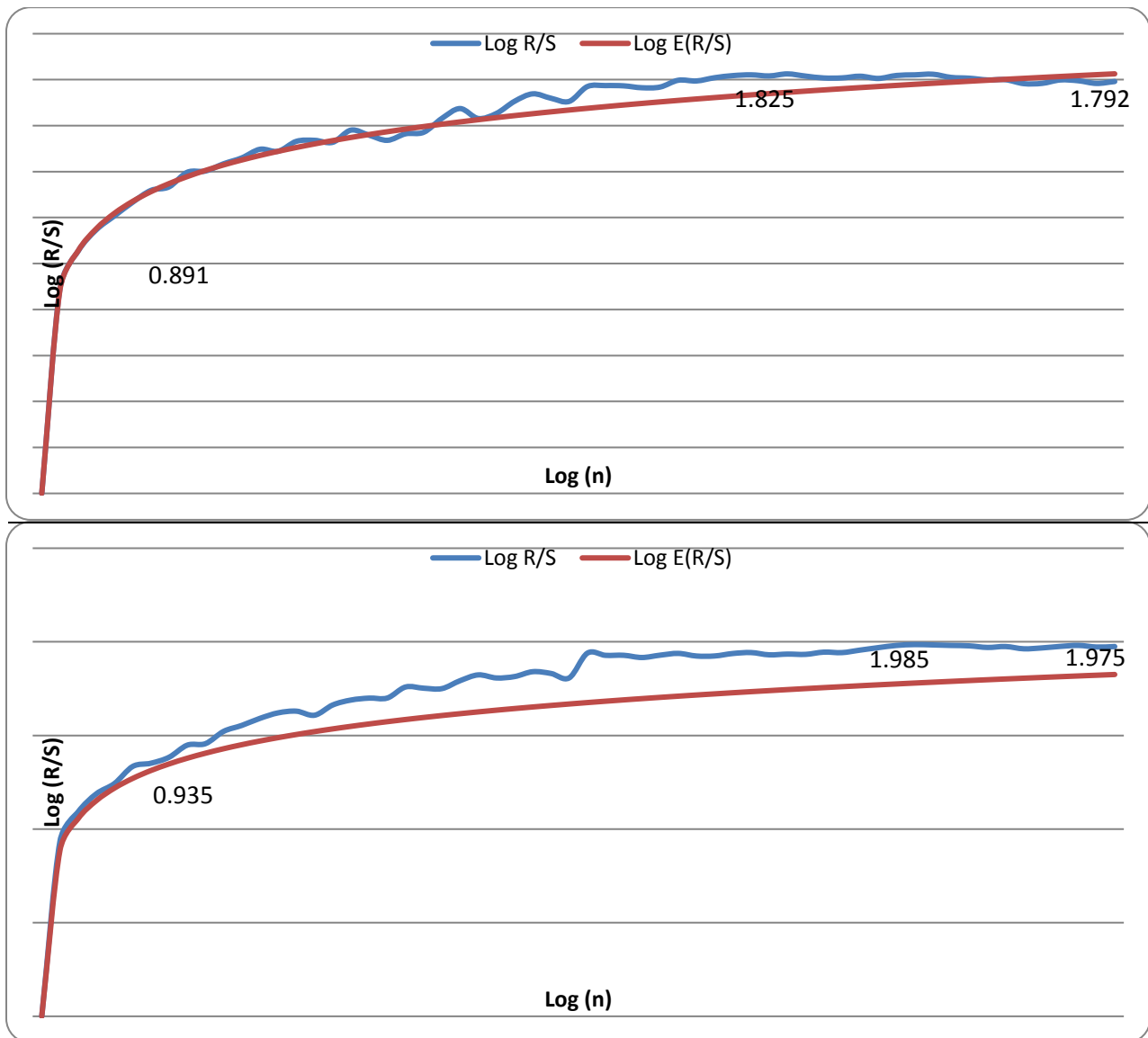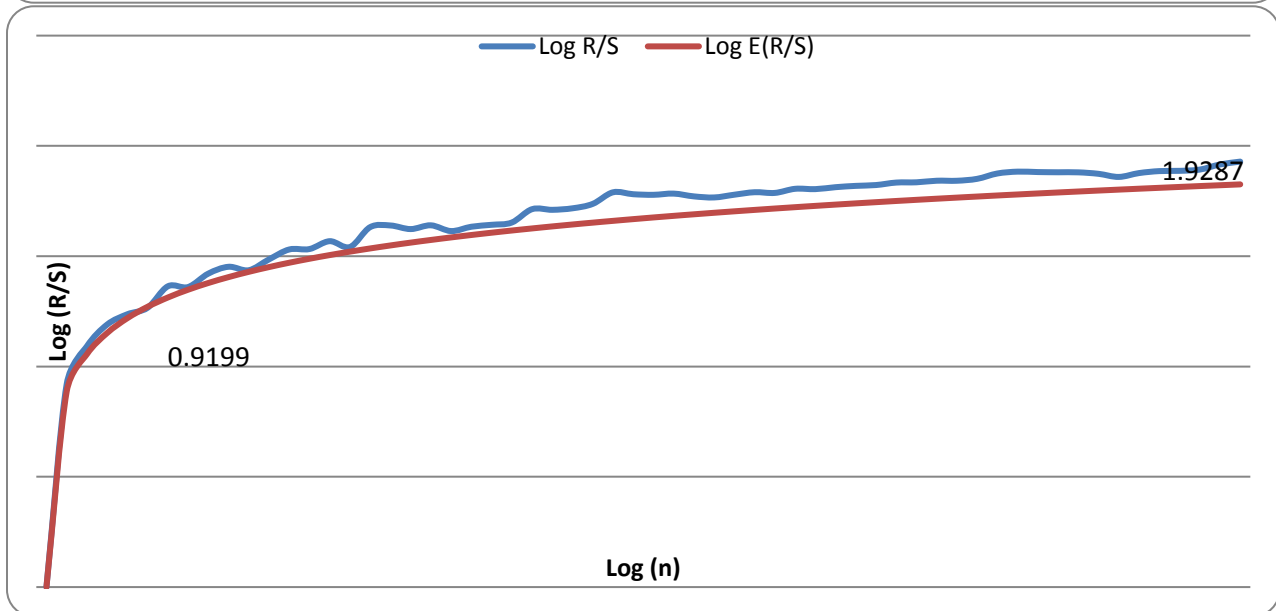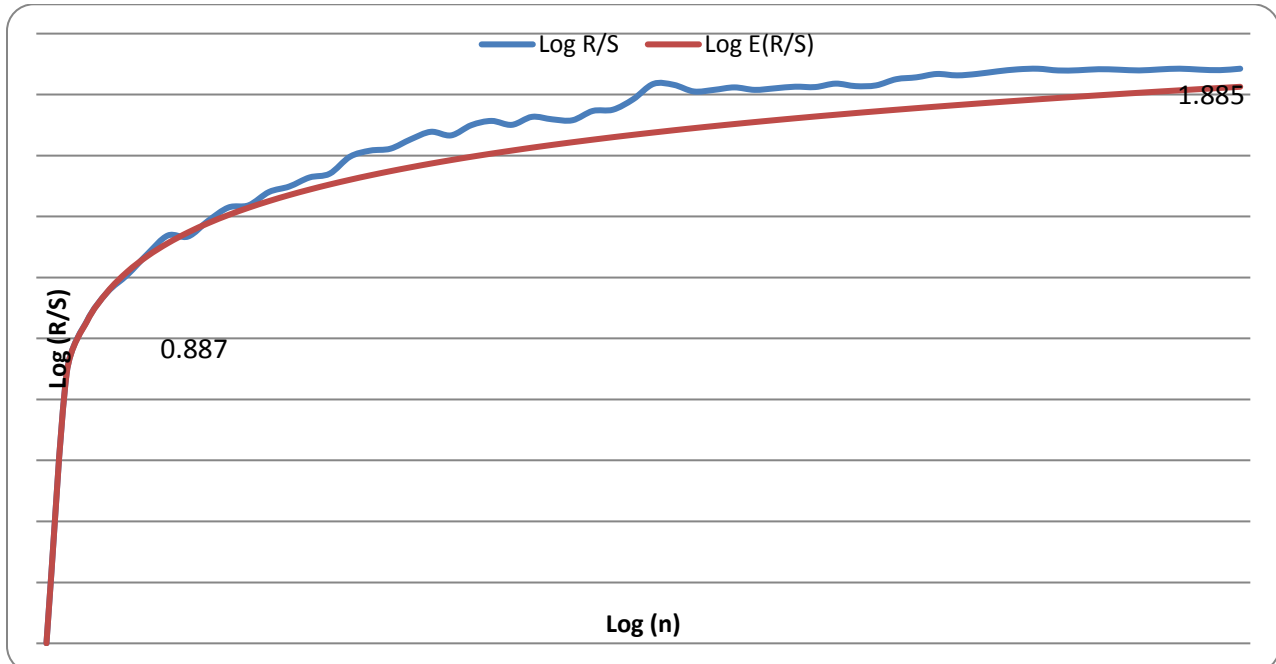
Chart- 4.1 displays the log-log plot, using the empirical (R/S) values and the expected R/S [E(R/S)] values, of S&P NSE Auto, FMCG, IT and Pharama during Study period from 1st April 2005 to March 2017. For NSE Auto it is clear from the above Chart that the log R/S plot scale was very close to the log E(R/S) plots from

starting point 1 to point 7 from Day 1 to Day 200. But the closeness of these two lines did not continue and the deviation was noticed from 600th day to 1450th day range from (1.591 to 1.807) after that the plot of Log R/S and Log E R/S again increased from period 1500th day. Later, the line of log R/S was deviated to that of log E(R/S) from point 33 (1550th day) to the point 59 (2950th day). It is noted that for NSE FMCG the expected rescaled range analysis. The highest values (1.825) of log R/S was recorded during a 2050th and the lowest value (0.819) of log (R/S) was registered at the starting period (n = 50). The second highest value (1.824) of log E(R/S) were found for the 2450th days and the second lowest value (1.054) of log E(R/S) were found for the 100th days period. For NSE IT is noted that the plot scale of log R/S was close to Log E (R/S) plot from starting to 17th Point i.e., until 500th day i.e., 1.437 from the starting period of time. After that, the R/S plot deviated on 650th day at the point 17th i.e., (1.528) to 59th point 2950th day i.e., 1.855. Finally for NSE Pharama from starting to 7th Point i.e., until 550th day i.e., 1.4856 from the starting period of time. After that, the R/S plot close to Log E R/S pot from 600th day at the Point 21th i.e., (1.638) to 25th Point 750 day i.e., 1.5416. From the overall analysis of the above chart, the series of log R/S and log E(R/S) were identical with the random walk. This clearly shows the fact that there was absence of long memory in the case of S&P NSE Auto, NSE FMCG, NSE IT and NSE Pharama during the study period from 1st April 2005 to 31st March 2017. Hence the null hypothesis H04,namely, **"There is no long range dependence in the returns of Selected Sample Listed in NSE",** isaccepted.

5   **Findings, Suggestions and Conclusion.**

5.1 Major Findings of the Study

From the above study it is to be noted that all the selected sectoral indices of National Stock Exchange (NSE) provided same negative average returns for the Investors i.e (-0.99), Skewness was found to be positive for all the selected NSE sectoral indices, it was found that NSE Pharma recorded highest skewness of 30.72171, With respect to the result of Kurtosis for NSE Sectoral Indices, NSE Pharma& NSE FMCG witnessed Leptokurtic distribution with the value of 1391.18, 1283.81 respectively, The volatility of selected NSE sectoral indices revealed that the daily returns were significant at 5% risk level, both in mean and

variance equation for all the selected NSE sectoral indices as the Beta and Alpha value were close to one, for NSE Auto 1.000153, The analysis of V-Statistic of S&P NSE FMCG during the study period clearly reveals the fact that the highest value of 1.5205 was recorded on 1500th day, followed by 1550th day, with a value of 1.5109. The S&P NSE Information Technology during the study witnessed less deviations (0.0498) first and next lowest values of 1.0907 and 1.1405 respectively.

The analysis of plot of V –Statistic for S&P NSE Pharma during the study period indicates the persistence in the returns generating process as the values were on the large deviation till the end of the study period.

5.2 Suggestions from the study

As all the sectoral indices witnessed negative mean returns, it is advisable for the investors to have a Portfolio of Investors which could help reduce the risk of investors. The S&P NSE FMCG would tend to increase in future also as long range dependence was absent. Hence past prices and current events which have its effect on FMCG companies should be analyzed before considering investments in FMCG. The results of S&P NSE Information Technology shows that the past data influenced the NSE IT Returns, it shows long term memory in the share price hence it was expected to continue the subsequent period also, as a result the stock return of S&P NSE IT would tend to increase in the future also. Hence the investors may use this information for best investment. It is clear that there was a deviation of long range memory in NSE Pharma, because from the second year onwards there is a large deviation between log (R/S) and Log E(R/S). It indicates the fact that the time series was not close to the expected value, when there is a change in the price the investors can easily identify the risk in the market and time.

5.3 Conclusion

The present study made an attempt to find the stock market prediction of selected sectoral indices listed in Bombay Stock Exchange of India Ltd and National Stock Exchange of India during the study period of twelve years from 1st April 2005 to 31st March 2017. The present study used different statistical tools, namely Desriptive Statistics (Mean, Standard Deviation, Skewness, and Kurtosis), Normality Test (Kolmogorov – Smirnov and Shapiro Wilk test), Stationarity Test

(Augmented Dickey-Fuller and Phillip-Perron) and Volatility test (Autoregressive Conditional Heteroskedasticity Model and Generalized Autoregressive Conditionally Heteroskedasticity Model).

From the study, it was found the rescaled range analysis can be a powerful measurement of the current and future share price movement of selected sample of NSE Sectoral Indices. A similar study may be conducted in future to investigate the long term memory persistence in different stock market index with different study period. Comparative study related for NSE and BSE Individual stock price with different tools like ANN, Hurst Component, AFRIMA and Spectral Density or Wavelet model with Weekly or monthly share price.

From the above analysis and findings, it is concluded that Information flow determines the intensity of returns for Investors. Hence careful evaluation of market information and its sensitivity can help investors retains and earn higher returns in stock markets.

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