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STOCK RETURN BEHAVIOR OF SELECTED COMPANIES IN INDIA

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Abstract: **Investment is all about sacrificing current money for the returns in future. Of the investments, stock investment is always considered as highly attractive. It is because stock will give more returns. However, the risk inherent in stock market investment makes the investment more risky. Therefore the investors are concerned about the behavior of stock returns. The current study is the empirical analysis of the stock return behaviour of Indian stock market by taking into consideration the randomness in returns, linearity in returns, volatility in returns and normality in returns.**

Keywords: **Autocorrelation, Stock return, Linearity in returns, Normality, Random behaviour, Random walk, Volatility, Weak form efficiency.**

1. INTRODUCTION

No other investment available holds as much potential as stocks over the long run[1]. Not real estate. Not bonds. Not savings accounts. Stocks are not the only things that belong in an investment portfolio, but they may be most important. When investors talk about stocks, they usually mean common stocks. A share of common stock represents a share of ownership in the company that issues it. The price of the stock goes up and down depending on how the company performs and how investors think the company will perform in future. The stock may or may not pay dividends, which usually comes from profit. If profits fall, dividend payout may be cut or eliminated. There are different categories of stocks like Growth socks, Income stocks, cyclical stocks, Defensive stocks, value stocks and Speculative stocks. Stocks are bought and sold through stock markets. Stock sold on an exchange is said to be listed there.

Return is a term that is of theoretical and practical importance. Returns are the gains or losses from a security for a particular period of time and are usually quoted as a percentage. Greater the return, greater will be the investment. Investors invest in those securities which promise higher return or high yields. Return is the foremost criteria based upon which investment planning is done and is considered as vital in security analysis. When uncertainty prevails in the market at a higher rate, investors will sell out their securities which lead the stock prices to recede to depression. Return constitutes an inseparable and inevitable element of security analysis.

The proponents of Efficient Market Hypothesis (EMH) evolved in the 1960s by Eugene Fama, state that the returns are random in an efficient market. A market is said to be efficient when one cannot make any gain with his technical savvy over the naïve investors who simply buy and hold. In efficient market when new information reaches, it will be assimilated, then and there, and reflected in the market price before anyone can take advantage to make personal gain. Under these circumstances, the current market price depicts an unbiased estimate of the value of the investment. Even though deviations may occur in forms of undervaluation or overvaluation of securities, these anomalies will not last long and they will disappear as early as they appeared.

The behavior of the stock return is the basis for the investors to invest in stock. The behavior of stock return refers to the pattern, time and the magnitude of the return. Equity behavior is characterized by the stability, predictability and its co-movement with market portfolio. An investor analyses these factors to study the behavior of returns and to take investment decisions. If there is any difference between expected and actual return, then the return cannot be said as stable. The variance is volatility. Any movement up or down from its expectation is volatility. The volatility may be either normal or abnormal. The abnormal volatility leads to panic in the market, which make investors lose their confidence. As a consequence, they will dispose-off their stock in the market at a higher rate. However, volatility cannot be always treated as wrong. Because, it can earn good returns when the market is bullish.

Normally, the movements in individual stock and that of market move together. This covariance shows the evidence of systematic risk in the market. Covariance is a measure of how much two random variables change together. If the greater values of one variable mainly correspond with the greater values of the other variable, and the same holds for the lesser values, i.e., the variables tend to show similar behavior, the covariance is positive.Greater the co-movement of individual stock with the portfolio market, greater the systematic risk, which can be measured using the statistic called beta. A share's beta is the measure of its relative volatility with respect to the market.

Return may not be always stable. It varies from time to time according to the changes in the micro and macro fundamentals. Basic assumption of the distribution of equity returns is that it complies with the normal distribution. Under normal distribution the mean, median and mode coincide. The distribution is devoid of skewness. All outcomes will be symmetrically distributed on either side of the mean.

The randomness and the linearity in returns also indicate the behavior of stock returns. The random walk assumption is that the price movements are completely at random and are totally independent of the past movements in price. Therefore the past and current prices cannot be used to predict the future price movements as done in technical analysis. Linear relationship is a statistical term used to describe the relationship between a variable and a constant. They can be expressed graphically where the variable and the constant are connected through a straight line or in a mathematical format where the independent variable is multiplied by the slope coefficient, added by a constant, which determines the dependent variable. Linear predictability of stock returns is widely accepted. However, recent studies suggest that stock returns are non-linear due to the salient role of noise and arbitrageurs in the market.

Through the study, an attempt is made to empirically analyze the stock return behavior with specific reference to India, and for that, the summary statistics of the selected 30 companies randomly selected are to be analyzed.

2. REVIEW OF LITERATURE

Greater attention has been paid towards the study of equity returns behavior by researchers in recent years. At the same time the study of equity returns is considered as difficult to analyze and interpret. However, more and more woks have been published analyzing the return behavior using varied techniques of measurement in the form of articles, research papers, theses and so on. Here, an attempt is made to review some of such studies regarding the stock return behavior that prompted this study.

Stock Returns and Volatility– In this paper, Richard T. Baillie and Ramon P. DeGennaro examine the relationship between mean returns on a stock portfolio and its conditional variance or standard deviation. They observed that while return variance is intuitively appealing measure of risk, the different approaches used in the past studies suggest no clear consensus regarding its relevance. This paper uses a relatively new approach to the empirical evidence for a relationship between the returns on a portfolio of stocks and the variance or standard deviation of those returns. They used GARCH in the mean models to jointly estimate the mean and variance processes. They found that the payment delays are significant determinants of mean stock returns and also are useful for obtaining more precise estimates of the conditional variance. The results of the paper, however, show almost no evidence of relationship between mean returns on a portfolio of stocks and the variance or standard deviation of those returns.

Stock Price Movement in India– In this thesis, Pankunni .V studied the stock price movement that consists of equity price behavior and equity return behavior during the period from 1999 to 2009. The study intended to know whether the stocks were mispriced or not in the midst of the vociferous stock price movement. He used summary statistics, covariance, correlation, R^2, beta coefficient for analysis and employed auto correlation to ascertain the inter-dependency and randomness of the stock prices. Through the study it was found that there was overwhelming price and return volatility in the market during 1999-2009. Average returns earned by the scrips were all low. The return on market portfolio, BSE30 index also was low. But the holding period yield was found increasing during the periodin spite of the frequent upheavals. The author remarks that risk perception of the individual stocks was found higher than the market portfolio, but the beta to measure such risk when shares were part of the portfolio did not reveal the true position of the risk. It was because beta showed only insignificant market related risk proving time out of number that it was unsuitable to measure the systematic risk of a stock.

Stock Market Volatility a Case Study in Indian Stock Market – This thesis of Nalina. K B is an exploratory study of stock market volatility based on secondary data and application of quantitative techniques to analyze stock market volatility. Through this research she tries to fill the gap in the field by characterizing the historical movement in aggregate as well as disaggregate volatility of Indian Stock Market.To determine whether Indian Stock Market is characterized by high volatility, French, Schwert and Stambaugh (1987) and Schwert (1989) model is used by the author to calculate monthly standard deviation of stock return as a measure of volatility.The methodology suggested by Campbell et al. (2001) is used to analyze disaggregated volatility measures for Indian Stock Exchange by the author.

Nonlinear Predictability of Stock Market Returns: Evidence from Nonparametric and Threshold Models - Recent empirical evidence suggests that stock market returns are predictable from a variety of financial and macroeconomic variables. However, with two exceptions this predictability is based upon a linear functional form. Through this paper David G.McMillan extends this research by considering whether a nonlinear relationship exists between stock market returns and these conditioning variables, and whether this nonlinearity can be exploited for forecasting improvements. **Stock Market and Macroeconomic Behavior in India[5] –** Sangeetha Chakravarthy, through this paper reexamines the relationship between stock price and some key macro economic variables in India for the period 1991-2005 using monthly time series data. The study uses Granger non causality test procedure developed by Toda and Yamamoto (1995). The results of the study indicate that index of industrial production and inflation Granger cause stock price but stock price does not cause either of the two so the causation is unidirectional.

Evidence of Nonlinearity in Daily Stock Returns - This article, jointly authored by Melvin J. Hinich and Douglas M. Patterson, applies a newly developed statistical technique to time series of daily rates of return of 15 common stocks. The technique involves estimating the bispectrum of the observed time series. The bispectrum is defined as the double Fourier transform of the third order cumulant function. If the process generating rates of return is linear with independent innovations, then the skewness of the bispectrum will be constant. This article describes a test that can detect non constant skewness in the bispectrum

The Volatility-Return Relationship: Insights from Linear and Non-Linear Quantile Regressions - This paper is jointly written by David E Allena, Abhay K Singha, Robert J Powella, Michael McAleerb James Taylor,c and Lyn Thomasd. This paper examines the asymmetric relationship between price and implied volatility and the associated extreme quantile dependence using a linear and non- linear quantile regression approach. They demonstrate that the relationship between the volatility and market return, as quantified by Ordinary Least Square (OLS) regression, is not uniform across the distribution of the volatility-price return pairs using quantile regressions. **Stock Returns Predictability and the Adaptive Market Hypothesis in Emerging Markets: Evidence from India -** Gourishankar S Hiremath and JyotiKumari, through this study addresses the question of whether the adaptive market hypothesis provides a better description of the behavior of emerging stock market like India. They employed linear and nonlinear methods to evaluate the hypothesis empirically. The linear tests show a cyclical pattern in linear dependence suggesting that the Indian stock market switched between periods of efficiency and inefficiency. The results provide additional insights on association between financial crises, foreign portfolio investments and inefficiency.

The Stock Market and Investment - Warren Tease, in this paper examine the relationship between equity prices andbusiness investment, addressing the question of whether investment is influenced byinefficient pricing in equity markets. It considers: whether share prices influence investmentonce some of the important macroeconomic determinants of investment arecontrolled for; whether estimates of the deviation of share prices from their estimatedequilibrium values affect investment; and the behavior of investment and share pricesin periods when share prices appear to have deviated widely from fundamentals.

Indian Stock Market - Random Walk Characteristics of Stock Returns – G. S. Hiremath, in this paper studies the behavior of stock returns in India. For thispurpose, data from 1997 to 2010 of 14 indices traded on the National stockexchange (NSE) and Bombay stock exchange (BSE) are used and several parametricand non-parametric methods are employed to empirically test the randomwalk characteristics of stock returns and examine the weak form efficiency of theIndian stock market. The results from parametric tests are mixed and validity ofrandom walk hypothesis (RWH) is suggested only for large cap and high liquidindices traded on the BSE. However, the same is not true in the case of NSE indexreturns.

Stock Return Volatility Patterns In India - AmitaBatra, in her paper, examines the time variation in volatility in the Indian stock market during 1979-2003. Using monthly data and asymmetric GARCH methodology augmented by structural change analysis the paper identifies sudden shifts in stock price volatility and the nature of events that cause these shifts in volatility.

Nonlinear Dependence in Stock Returns: Evidences from India– This paper ofGourishankar S Hiremath and BandiKamaiahtest non-linear dependence in stock returns of indices at two premier Indian stock exchanges namely, NSE and BSE. A set of non-linear tests are applied to examine the behavior of stock returns. Strong evidences of non-linear dependences for almost all index returns of NSE and BSE are found in the study. The results from windowed Hinich test showed that the reported non-linear dependencies are not consistent during the whole period suggesting presence of episodic non-linear dependencies in returns series surrounded by long periods of pure noise.

Volatility patterns of stock returns in India – The paper byDr. Rosy Kalra andMr. Piyuesh Pandeyanalyzes the time variation in volatility inthe Indian stock market during 2009 – 2014. The paper examines if there has been anincrease or a decrease in volatility persistence in theIndian stock market on account of the process offinancial slowdown in India after the global crisis.

Some Further Evidence on the Behaviour of Stock Returns in India – This paper, written by Gourishankar S Hiremath and BandiKamaiah examines the stock return behaviour in two premier Indian stock markets using Chow-Denning multiple variance ratio and Hinich bicorrelation tests. The former test overcomes size distortion of conventional variance ratio test. The latter test is capable of detecting linear and non-linear dependencies. The study is based on 14 indices relating to the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE), and relates to the period 02/06/1997 to 30/01/2009. The Chow-Denning test rejects the null of random walk for six indices. The multiple variance ratio tests show that CNX Nifty Junior, CNX 500, CNX Bank Nifty, BSE 500, BSE Midcap and BSE Small cap reject the random walk hypothesis and return series are characterized by the presence of linear dependencies. The Hinich test rejects the null of pure white noise for full sample period. However, the windowed test results of Hinich show that the serial dependencies are not consistent across the sample period for all indices. This indicates presence of episodic dependencies in stock returns surrounded by long periods of pure noise. In other words, the Indian stock markets are weak form efficient but not all the time. This conclusion is consistent with Bonilla *et al* (2006) for Latin America.

3. OBJECTIVES AND METHODOLOGY OF THE STUDY

The major objectives of the study are as follows:

1. To analyse the average stock return of the selected companies.
2. To study the volatility in the stock returns of selected companies.
3. To analyse the randomness of the stock returns of selected companies.
4. To assess the linearity in stock returns of selected companies.

The methodology of the study can be pointed in the following heads.

- Data: The data for the study are secondary data. The data relating to the companies selected based on the criteria was collected from the official website of BSE stock exchange. .The study is conducted based on the criteria: 15 stocks graded as top traded during 2015-16 listed in BSE.

- Period of the study: The study covers a period of five years starting from 2011-12 to 2015-16 and data relating to the companies for the said period.

- Sampling Methods: For the study, 15 companies from 15 industries of India were selected from the A-list companies of BSE based on the criteria of top traded stocks of 2015-16. The data relating to the companies for a period of 5 years was collected along with that of S&P BSE Sensex, which is taken as market.

- Analysis tools: Using the data, the daily returns, yearly returns and average returns were found to calculate standard deviation, variance, coefficient of variation, skewness, kurtosis, correlation, covariance, beta and coefficient of determination. Linearity between returns and risk are analyzed using the Ordinary Least Square (OLS) method.The test for randomness is conducted using autocorrelation. The test for volatility was done using standard deviation and heteroscedasticity test. The normality in returns was tested using skewness, kurtosis and Jarque-Bera test.

4. ANALYSIS OF SUMMARY STATISTICS

The first part of the analysis constitutes the summary statistics of the selected stocks which is shown in table 4.1.

TABLE No.4.1: Comparative Analysis Table

Scrip	$\bar{X}$	σ	$σ^2$	skew	Kurt	r	C.V	cov	β	R^2	JB	AR	max	min	R
Lupin	0.12	1.62	2.62	-0.10	3.89	0.30	13.50	0.50	0.46	0.09	42.94	30.88	5.39	-6.82	12.21
Tata steel	-0.06	2.23	4.97	0.07	4.50	0.64	-37.17	1.49	1.36	0.41	117.76	-18.80	10.22	-13.11	23.33
Tata motors	-0.002	3.26	10.63	-12.20	305.74	0.49	-1630.0	1.66	1.51	0.24	4762241	-3.90	9.88	-80.33	90.71
SBIN	-0.07	3.24	10.50	-17.15	478.23	0.41	-46.29	1.40	1.28	0.17	11719871	40.02	9.74	-89.80	99.54
LT	-0.01	2.15	4.62	-2.45	40.25	0.63	-215.00	1.42	1.29	0.40	72888.15	-8.93	7.11	-31.53	38.64
TCS	0.07	1.61	2.59	0.25	8.18	0.44	23.00	0.40	0.68	0.19	1396.06	16.02	12.84	-9.73	21.57
Reliance	0.01	1.68	2.82	0.01	4.12	0.71	168.00	1.25	1.14	0.51	64.39	-1.04	5.72	-8.64	14.36
Adani	0.08	2.45	6.00	0.20	4.75	0.42	30.63	1.08	0.99	0.18	165.57	13.09	12.20	-10.77	22.97
Coal	0.02	1.86	3.46	0.41	7.66	0.39	93.00	0.76	0.69	0.15	1154.81	-0.24	12.73	-9.89	22.62
HUL	0.09	1.55	2.40	1.72	17.93	0.31	17.22	0.50	0.46	0.10	12120.29	22.58	17.28	-5.45	22.73
Asian paints	0.03	3.03	9.18	-21.27	634.99	0.25	101.00	0.78	0.72	0.06	20712797	-21.40	7.46	-90.03	97.49
ITC	0.06	1.51	2.28	-0.32	5.79	0.48	25.17	0.75	0.69	0.23	424.84	13.64	8.23	-8.27	16.5
ONGC	-0.06	2.90	8.41	-14.71	391.87	0.38	-48.33	1.15	1.05	0.14	7851550	-28.74	10.57	-76.40	86.97
HDFC	0.06	1.73	2.99	0.17	4.36	0.69	28.83	1.26	1.15	0.48	101.88	11.69	8.41	-7.70	16.11
Bharti Airtel	0.01	1.94	3.76	0.24	4.09	0.47	194.00	0.95	0.87	0.23	73.62	-2.30	8.15	-6.60	14.75
Sensex	**0.02**	**1.05**	**1.10**	**-0.11**	**4.52**	**1**	**52.50**	**1**	**1**	**1**	**122.31**	**4.57**	**3.77**	**-5.94**	**9.71**

- Average return of the 15 stocks – 0.02
- Average standard deviation of the 15 stocks – 2.18
- Average variance of the 15 stocks – 5.15

From the Table No.4.1, it can be seen that the highest mean return is earned by Lupin Ltd. with 0.12% return, while the lowest is earned by Tata motors with -0.002% return. Tata motors has the highest standard deviation of 3.26 and ITC has lowest with 1.51. As far as variance is considered, Tata motors has the highest variance of 10.63, while ITC with 2.28 variance has lowest. It means that Tata motors is the most volatile stock among the selected stocks and ITC least volatile. Tata motors has the highest coefficient of variation of -1630.00 times and Lupin with lowest with 13.50.

Of the total 15 stocks, 7 stocks returns are negatively skewed, while 8 stocks are positively skewed. It means that most of the stocks are earning returns that are more than mean return. Of the negatively skewed stocks, Asian paints has the highest negative skewness of -21.27 and Lupin has lowest negative skewness of -0.10. Of the positively skewed stocks, HUL has highest positive skewness of 1.72, while Reliance has lowest with 0.01. The presence of skewness shows that all stock returns are not normal.

While analyzing the kurtosis of the stock return, it is important to note that all the stocks are leptokurtic including the market. Asian paints has the highest coefficient of kurtosis of 634.99 with an excess kurtosis of 631.99 (634.99 – 3.00) and Lupin Ltd has the lowest kurtosis of 3.89 with an excess kurtosis of 0.89 (3.89 – 3.00). It shows that the returns of all stocks are sticking towards its mean making both tails fat. No return distribution is a normal distribution including the market.

Of the selected 15 companies, Reliance has the highest correlation with market with a coefficient of 0.71, while Asian paints has the lowest correlation of 0.25 with the market. It implies that Reliance is the most risky stock while Asian paints is less risky. Tata motors has the highest covariance with the market (1.66), whereas TCS has the lowest covariance with the market (0.40). It implies that Tata motors is more volatile than the market, while TCS is less volatile than the market. Tata motors is the most aggressive share with a beta of 1.51, while Lupin and HUL are the defensive shares with lowest beta of 0.46. It means that Tata motors has the highest systematic risk and it cannot be eliminated through diversification. Lupin and HUL are with least systematic risks and proper diversification can make such stocks attractive.

Reliance has the highest coefficient of determination (R^2) of 51% and Asian paints has the lowest R^2 of 6%. Hence, Reliance can be said as less risky since only 49% is unexplained by the market and Asian paints as risky since 94% of the returns is unexplained by the market.

All the stocks including market has a positive Jarque-Bera greater than the chi-square value (@5% level of significance and 2% degree of freedom) of 5.991, which means that all the stock returns are not normal.

Of the 15 stocks, SBIN has the highest annualized returns of 40.02% and ONGC has the lowest annualized return of -28.74%. The maximum return recorded during the period of study is 17.28 by HUL and the minimum return recorded is -90.03 by the Asian paints. The stock with returns of highest range is SBIN with a range of 99.54% and of lowest range is Lupin Ltd with 12.21% range. It means that SBIN is the most volatile stock while Lupin Ltd is less volatile.

5. ANALYSIS OF STOCK RETURN BEHAVIOR

The second part of the analysis is the analysis of stock return behavior in terms of linearity, stationarity, volatility and normality. The analysis result of linearity is shown in table 5.1 and autocorrelation results in table 5.2 and 5.3.

Table No. 5.1: Analysis of Linearity

Sl. No.	SCRIP	r	Covariance	R^2	β	t-statistic of beta	χ^2 p value @5% level
1	**Lupin Ltd.**	0.30	0.50	0.09	0.46	10.87	0.00
2	**Tata steelLtd.**	0.64	1.49	0.41	1.36	29.32	0.00
3	**Tata motors Ltd.**	0.49	1.66	0.24	1.51	19.52	0.00
4	**SBIN**	0.41	1.40	0.17	1.28	15.99	0.00
5	**LTLtd.**	0.63	1.42	0.40	1.29	28.57	0.00
6	**TCSLtd.**	0.44	0.40	0.19	0.68	17.30	0.00
7	**Reliance Ltd.**	0.71	1.25	0.51	1.14	35.82	0.00
8	**AdaniLtd.**	0.42	1.08	0.18	0.99	16.41	0.00
9	**CoalLtd.**	0.39	0.76	0.15	0.69	14.81	0.00
10	**HUL**	0.31	0.50	0.10	0.46	11.45	0.00
11	**Asian paintsLtd.**	0.25	0.78	0.06	0.72	8.99	0.00
12	**ITC Ltd.**	0.48	0.75	0.23	0.69	19.06	0.00
13	**ONGCLtd.**	0.38	1.15	0.14	1.05	14.47	0.00
14	**HDFCLtd.**	0.69	1.26	0.48	1.15	33.88	0.00
15	**Bharti AirtelLtd.**	0.47	0.95	0.23	0.87	18.61	0.00
	Sensex	**1**	**1**	**1**	**1**		

Table No.5.2. Auto-Correlation of Residuals (Lag – 1)

Sl.No	Name of Stocks	Auto-Correlation	Q - Statistic	Probability
1	Lupin Ltd.	0.042	2.1824	0.140
2	Tata steel Ltd.	0.060	4.4395	0.035
3	Tata motors Ltd.	0.040	1.9451	0.163
4	SBIN	0.015	0.2620	0.609
5	LT Ltd.	0.026	0.8190	0.365
6	TCS Ltd.	0.013	0.2054	0.650
7	Reliance Ltd.	0.018	0.4039	0.525
8	Adani Ltd.	-0.051	3.2258	0.072
9	Coal Ltd.	-0.023	0.6618	0.416
10	HUL	0.051	3.2048	0.073
11	Asian paints Ltd.	-0.005	0.0269	0.870
12	ITC Ltd.	0.030	1.0874	0.297
13	ONGC Ltd.	0.004	0.0156	0.901
14	HDFC Ltd.	-0.081	8.2029	0.004
15	Bharti Airtel Ltd.	-0.058	4.1353	0.042

Table No.5.3. Auto-Correlation of Squared Residuals (Lag – 1)

Sl.No	Name of Stocks	Auto-Correlation	Q - Statistic	Probability
1	Lupin Ltd.	0.172	36.743	0.000
2	Tata steel Ltd.	0.082	8.2941	0.004
3	Tata motors Ltd.	0.001	0.0019	0.965
4	SBIN	-0.001	0.0012	0.973
5	LT Ltd.	-0.002	0.0067	0.935
6	TCS Ltd.	0.045	2.5243	0.112
7	Reliance Ltd.	0.038	1.7756	0.183
8	Adani Ltd.	0.219	59.487	0.000
9	Coal Ltd.	0.075	6.9700	0.008
10	HUL	0.145	26.095	0.000
11	Asian paints Ltd.	-0.001	0.0014	0.971
12	ITC Ltd.	0.138	23.558	0.000
13	ONGC Ltd.	-0.001	0.0023	0.962
14	HDFC Ltd.	0.145	26.100	0.000
15	Bharti Airtel Ltd.	0.124	19.421	0.000

5.1. Volatility in Returns

Volatility is an important behavior of returns. Volatility occurs when time passes and new information reaches in the market. Volatility is measured by the statistic standard deviation. Standard deviation, denoted by the Greek alphabet σ, is usually expressed in absolute terms. In order to strip the negative/positive sign, usually σ is squared and obtains variance σ^2. Standard deviation is a measure of dispersion from the expected value. It represents the risk of holding stocks. In this study, standard deviation is used to measure the volatility of stock return. Annual standard deviation is calculated by using the equation (4.3). Volatility are of two types. They are

1. Homoscedastic: where the volatility varies at a constant and identical rate.
2. Heteroscedastic: where the volatility varies at varying and dissimilar rate.

5.1.1. Lupin Ltd.

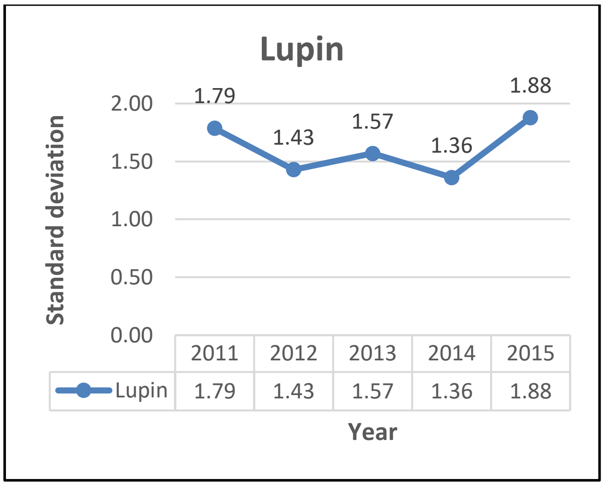

Figure 5.1: Standard deviation of Lupin for 5 years

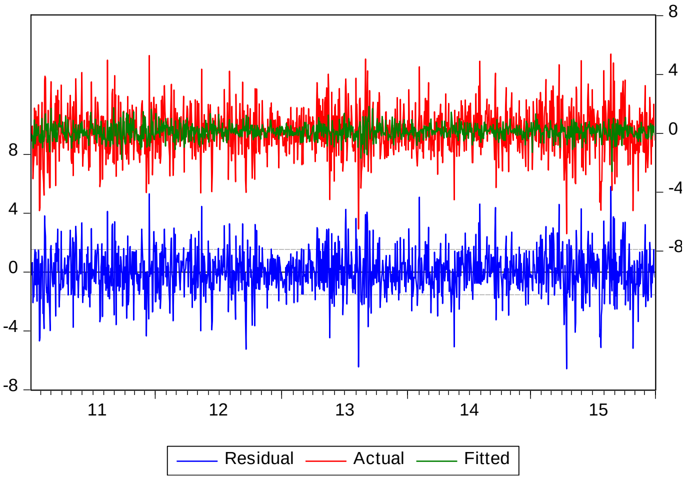

Figure 5.2: Residuals plot of Lupin

Table No. 5.4. Heteroscedastic test (ARCH) of Lupin

Observed R^2	36.64154	Prob. (Chi-square)	0.000

As per figure 5.1, the standard deviation (SD) in 2011 is 1.79. In 2015, it is 1.88. The standard deviation is increasing at a rate of 5% [(1.88-1.79)/1.79*100]. The standard deviation is very high. The average SD during this period is 1.62. When compared to the mean of 0.12, the SD is 13.5 times higher. In between 2011 and 2015, there were slight fluctuations in the SD, but the fluctuations are not significant.

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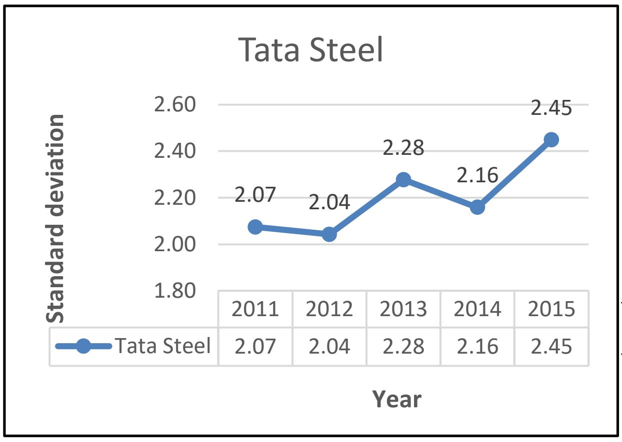
Figure 5.2 is the plot of residuals. The residuals shows greater amount of volatility clustering and heteroscedasticity. The conditional volatility of Lupin was very high. Small volatility was followed by small volatility for a long time and then higher volatility was followed by higher volatility for a prolonged period of time. The residual plot reveals this phenomenon. It can be noticed from the figure that the volatility is not at a uniform rate. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 36.64 and its probability is zero (see Table No.5.4). Since the probability is zero, that is less than 5%, at 5% level of significance, the H_0 cannot be accepted. The H_0 is that, there is no heteroscedasticity. Hence, it can be concluded that the residual distribution of Lupin Ltd. has volatility clustering and heteroscedasticity.

5.1.2. Tata Steel Ltd.



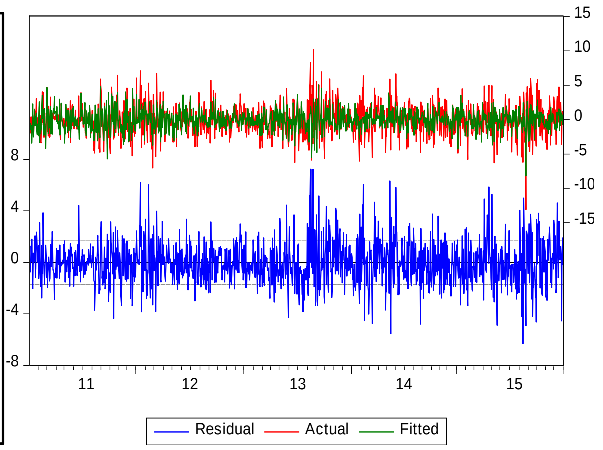


Figure 5.3: Standard deviation of Tata Steel for 5 years

Figure 5.4: Residuals Plot of Tata Steel

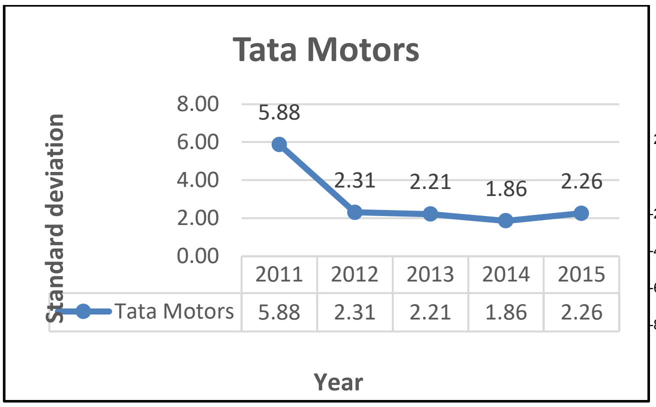
Table No. 5.5. Heteroscedastic test (ARCH) of Tata Steel

Observed R^2	8.270506	Prob. (Chi-square)	0.0040

As per figure 5.3, the standard deviation (SD) in 2011 is 2.07. In 2015, it is 2.45. The standard deviation is increasing at a rate of 18.35% [(2.45-2.07)/2.07*100]. The standard deviation is very high. In between 2011 and 2015, there were slight fluctuations in the SD, but the fluctuations are not significant.

Figure 5.4 is the plot of residuals. The residuals shows greater amount of volatility clustering and heteroscedasticity. The conditional volatility of Tata Steel was very high. It can be noticed from the figure that the volatility is not at a uniform rate. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 8.27 and its probability is 0.4%as shown in Table No.5.4. Since the probability is less than 5%, the H_0 cannot be accepted. Hence, it can be concluded that the residual distribution of Lupin Ltd. has volatility clustering and heteroscedasticity.

5.1.3. Tata Motors



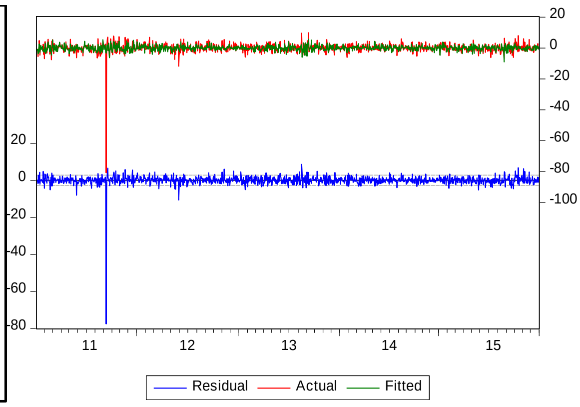


Figure 5.5: Standard deviation of Tata Motors for 5 years

Figure 5.6: Residuals Plot of Tata Motors

Table No. 5.6. Heteroscedastic test (ARCH) of Tata Motors

Observed R^2	0.001899	Prob. (Chi-square)	0.9652

As per figure 5.5, the standard deviation (SD) in 2011 is 5.88. In 2015, it is 2.26. The standard deviation is increasing at a rate of 160%. The standard deviation is very high and fluctuating. In between 2011 and 2015, there were slight fluctuations in the SD, but the fluctuations are not significant. Figure 5.6 is the plot of residuals. The residuals shows a constant volatility. There is no conditional volatility for Tata Motors. It can be noticed from the figure that the volatility is at a uniform rate. No heteroscedasticity and volatility clustering are found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 0.001899 and its probability is 96.52% as shown in Table No.5.6. Since the probability is greater than 5%, the H_0 cannot be rejected. Hence, it can be concluded that the residual distribution of Tata motors Ltd. has no volatility clustering and heteroscedasticity.

5.1.4. SBIN

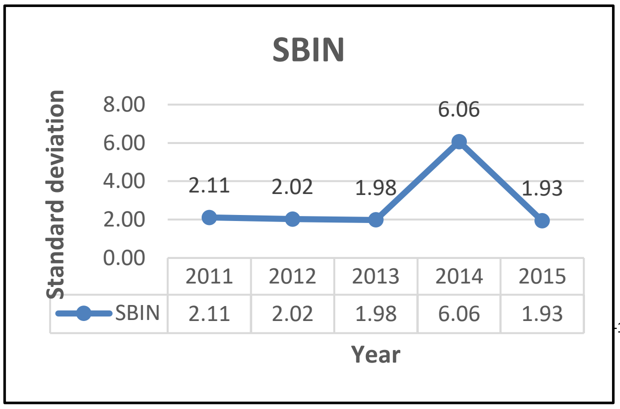


Figure 5.7: Standard deviation of SBIN for 5 years

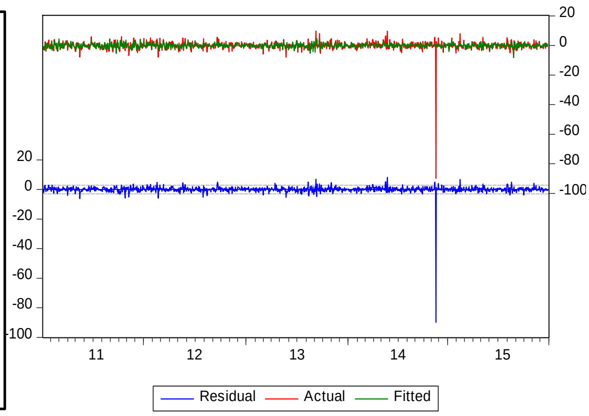


Figure 5.8: Residuals Plot of SBIN

Table No. 5.7. Heteroscedastic test (ARCH) of SBIN

Observed R^2	0.001184	Prob. (Chi-square)	0.9725

As per figure 5.7, the standard deviation (SD) in 2011 is 2.11. In 2015, it is 1.93. The standard deviation was decreasing except in the year 2014. In 2014, the SD made a sudden increase and immediately fell down to 1.93.Otherwise, SD was more or less stable.SBIN has a very high amount of SD denoting high volatility in returns. Figure 5.8 is the plot of residuals. The residuals shows a constant volatility. There is no conditional volatility for SBIN. It can be noticed from the figure that the volatility is at a uniform rate. No heteroscedasticity and volatility clustering are found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 0.001184 and its probability is 97.25% as shown in Table No.5.7. Since the probability is greater than 5%, the H_0 cannot be rejected. Hence, it can be concluded that the residual distribution of SBIN has no volatility clustering and heteroscedasticity.

5.1.5. LT Ltd.

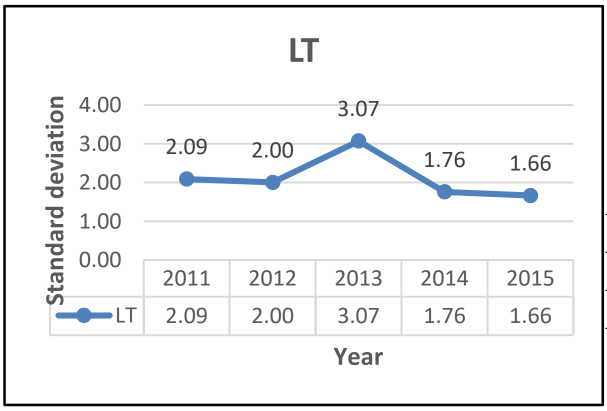


Figure 5.9: Standard deviation of LT for 5 years

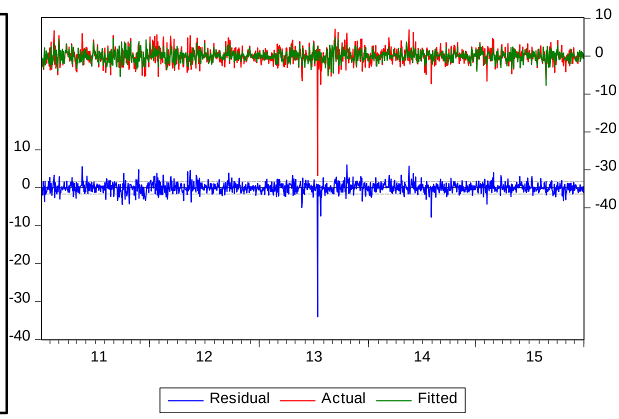


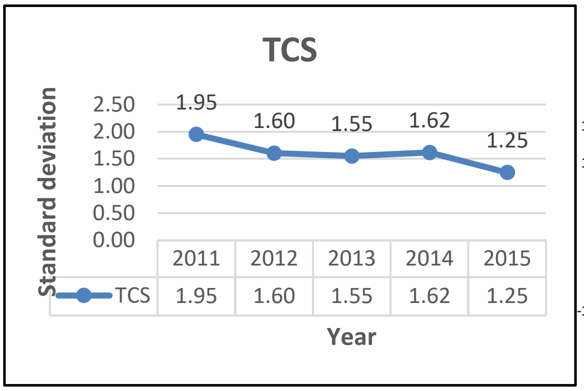
Figure 5.10: Residuals Plot of LT

Table No. 5.8. Heteroscedastic test (ARCH) of LT

Observed R^2	0.006679	Prob. (Chi-square)	0.9349	

As per figure 5.9, the standard deviation (SD) in 2011 is 2.09. In 2015, it is 1.66. The standard deviation was decreasing except in the year 2013. In 2013, the SD made a sudden increase to 3.07 and immediately fell down to 1.76.Otherwise, SD was more or less stable. LT has a very high amount of SD denoting high volatility in returns. Figure 5.10 is the plot of residuals. The residuals shows a constant volatility. There is no conditional volatility for LT. It can be noticed from the figure that the volatility is at a uniform rate. No heteroscedasticity and volatility clustering are found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 0.006679and its probability is 93.49% as shown in Table No.5.8. Since the probability is greater than 5%, the H_0 cannot be rejected. Hence, it can be concluded that the residual distribution of LT has no volatility clustering and heteroscedasticity.

5.1.6. TCS



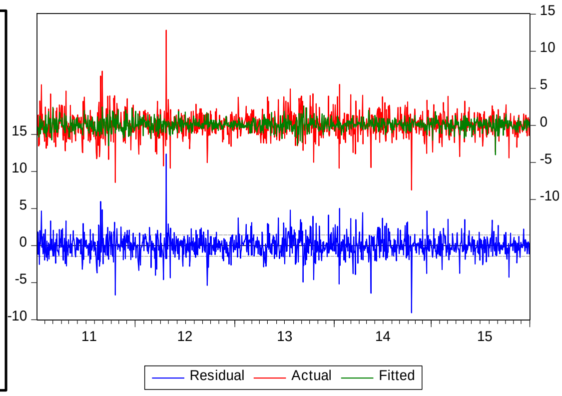


Figure 5.11: Standard deviation of TCS for 5 years **Figure 5.12: Residuals Plot of TCS**

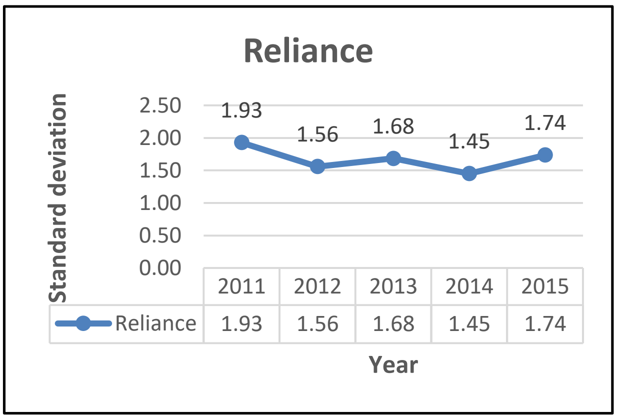
Table No. 5.9. Heteroscedastic test (ARCH) of TCS

Observed R^2	2.516352	Prob. (Chi-square)	0.1127

As per figure 5.11, the standard deviation (SD) in 2011 is 1.95. In 2015, it is 1.25. The standard deviation was decreasing except in the year 2014. In 2014, the SD made a sudden increase to 1.62 and immediately fell down to 1.25 in 2015.Otherwise, SD was more or less stable. TCS has a high amount of SD denoting high volatility in returns.

Figure 5.12 is the plot of residuals. The residuals shows a constant volatility. There is no conditional volatility for SBIN. It can be noticed from the figure that the volatility is at a uniform rate. No heteroscedasticity and volatility clustering are found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 2.516352 and its probability is 11.24% as shown in Table No.5.9. Since the probability is greater than 5%, the H_0 cannot be rejected. Hence, it can be concluded that the residual distribution of TCS has no volatility clustering and heteroscedasticity.

5.1.7. Reliance Industries Ltd.



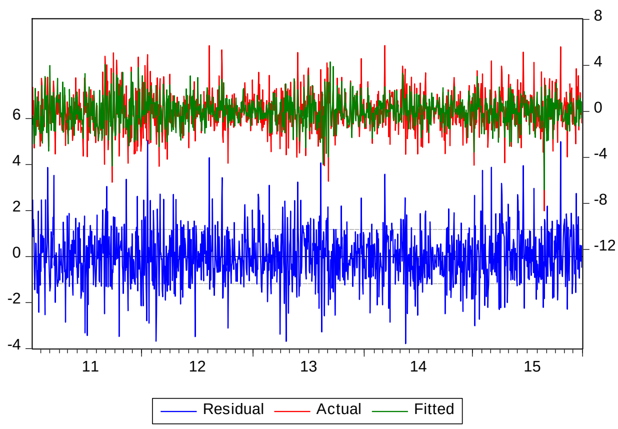


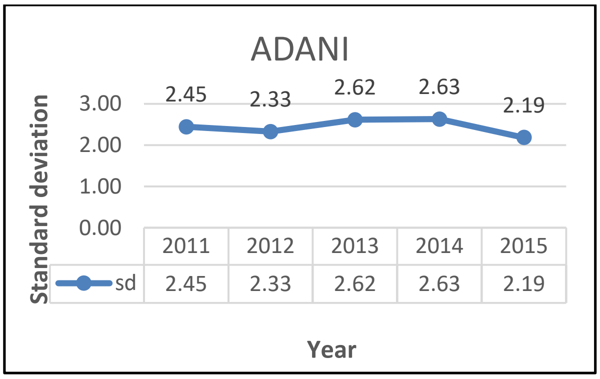
Figure 5.13: Standard deviation of Reliance for 5 years **Figure 5.14: Residuals Plot of Reliance Industries**

Table No. 5.10. Heteroscedastic test (ARCH) of Reliance Industries

Observed R^2	1.775962	Prob. (Chi-square)	0.1826

As per figure 5.13, the standard deviation (SD) in 2011 is 1.93. In 2015, it is 1.74. The standard deviation was decreasing except in the year 2014 and 2015. In 2013, the SD made a sudden increase to 1.68and immediately fell down to 1.45 in 2014. Otherwise, SD was more or less stable. Reliance industries has a high amount of SD denoting high volatility in returns. Figure 5.14 is the plot of residuals. The residuals shows a constant volatility. There is no conditional volatility for Reliance. It can be noticed from the figure that the volatility is at a uniform rate. No heteroscedasticity and volatility clustering are found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 1.775962and its probability is 18.26% as shown in Table No.5.10. Since the probability is greater than 5%, the H_0 cannot be rejected. Hence, it can be concluded that the residual distribution of Reliance industries has no volatility clustering and heteroscedasticity.

5.1.8. Adani Ports



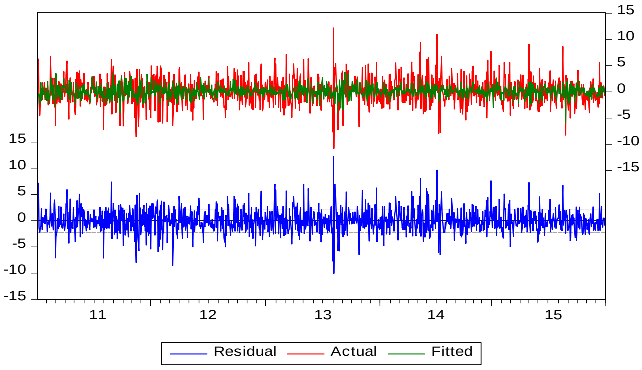


Figure 5.15: Standard deviation of Adani Ports for 5 years

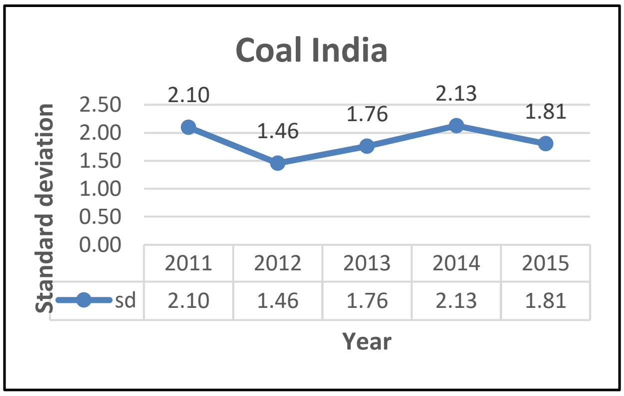
Figure 5.16: Residuals Plot of Adani Ports

Table No. 5.11. Heteroscedastic test (ARCH) of Adani Ports

Observed R^2	59.30439	Prob. (Chi-square)	0.000

As per figure 5.15, the standard deviation (SD) in 2011 is 2.45. In 2015, it is 2.19. The standard deviation was increasing except in the year 2012 and 2015. In 2012, the SD made a sudden increase to 2.33 and immediately rises to 2.62 in 2013, to 2.63 in 2014.Adani Ports has a high amount of SD denoting high volatility in returns. Figure 5.16 is the plot of residuals. The residuals shows a clustered volatility. There is conditional volatility for Adani ports. It can be noticed from the figure that the volatility is not at a uniform rate. Heteroscedasticity and volatility clustering are found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 59.30439and its probability is 0% as shown in Table No.5.11. Since the probability is less than 5%, the H_0 cannot be accepted. Hence, it can be concluded that the residual distribution of Adani ports has both volatility clustering and heteroscedasticity.

5.1.9. Coal India Ltd.



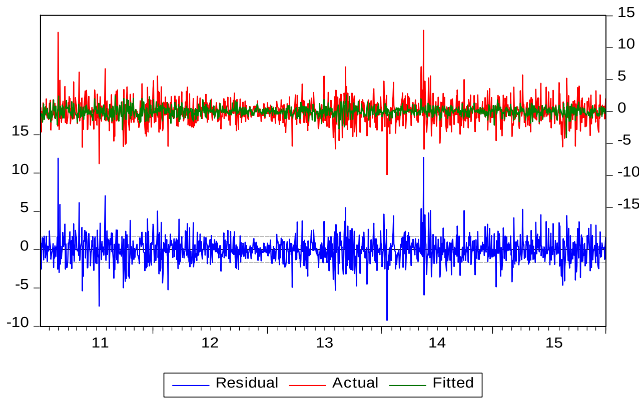


Figure 5.17: Standard deviation of Coal India for 5 years

Figure 5.18: Residuals Plot of Coal India

Table No. 5.12. Heteroscedastic test (ARCH) of Coal India

Observed R^2	6.947957	Prob. (Chi-square)	0.0084

As per figure 5.17, the standard deviation (SD) in 2011 is 2.10. In 2012, it decreased to1.46. The standard deviation for all years are very high when compared to the mean for the respective years.Coal India has a high amount of SD denoting high volatility in returns. Figure 5.18 is the plot of residuals. The residuals shows a clustered volatility. There is conditional volatility for Coal India. It can be noticed from the figure that the volatility is not at a uniform rate. Heteroscedasticity and volatility clustering are found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 6.947957and its probability is 0.84% as shown in Table No.5.12. Since the probability is less than 5%, the H_0 cannot be accepted. Thus, it can be concluded that the residual distribution of Coal India has both volatility clustering and heteroscedasticity.

5.1.10. HUL Ltd.

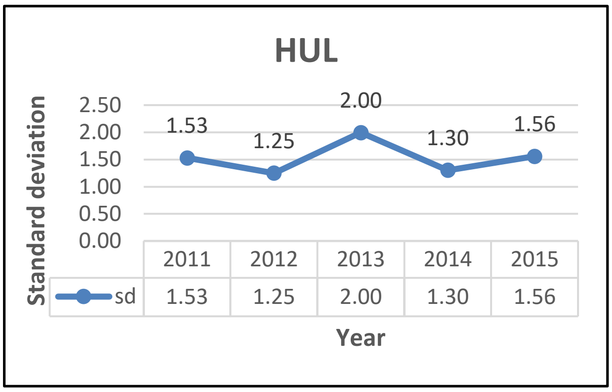


Figure 5.19: Standard deviation of HUL for 5 years

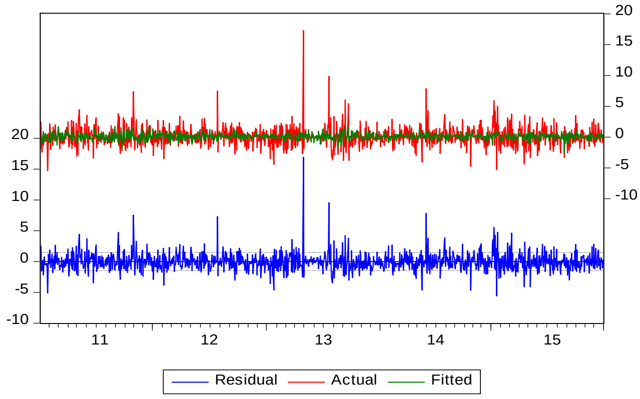


Figure 5.20: Residuals Plot of HUL

Table No. 5.13. Heteroscedastic test (ARCH) of HUL Ltd.

Observed R^2	26.01819	Prob. (Chi-square)	0.000

As per figure 5.19, the standard deviation (SD) in 2011 is 1.53. In 2015, it is 1.56. The standard deviation was increasing except in the year 2012 and 2014. The figure showed mild fluctuations year after year, but the SD is very high in all years when compared to the means of the respective years.HUL has a high amount of SD denoting high volatility in returns. Figure 5.20 is the plot of residuals. The residuals shows a clustered volatility. There is conditional volatility for Adani ports. It can be noticed from the figure that the volatility is not at a uniform rate. Heteroscedasticity and volatility clustering are found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 26.01819and its probability is 0% as shown in Table No.5.13. Since the probability is less than 5%, the H_0 cannot be accepted. Hence, it can be concluded that the residual distribution of HUL Ltd has both the volatility clustering and heteroscedasticity.

5.1.11. Asian Paints

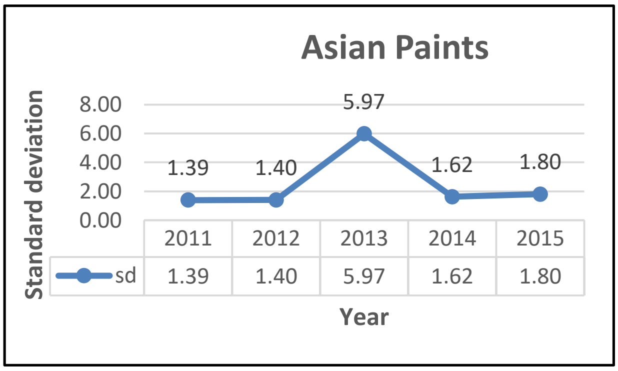


Figure 5.21: Standard deviation of Asian Paints for 5 years

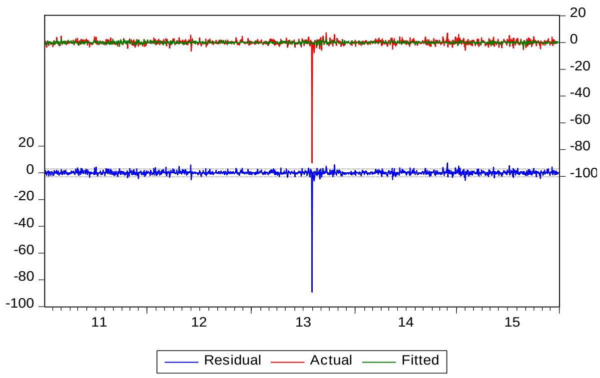


Figure 5.22: Residuals Plot of Asian Paints

Table No. 5.14. Heteroscedastic test (ARCH) of Asian Paints

Observed R^2	0.001360	Prob. (Chi-square)	0.9706

As per figure 5.21, the standard deviation (SD) in 2011 is 1.39. In 2015, it is 1.80. The standard deviation was increasing with an extreme rise in 2013 to 5.97. The figure showed mild fluctuations year after year, but the SD is very high in all years when compared to the means of the respective years. Asian Paints has a high amount of SD denoting high volatility in returns. Figure 5.22 is the plot of residuals. The residuals shows no clustered volatility. There is no conditional volatility for Asian Paints. It can be noticed from the figure that the volatility is at a uniform rate. Heteroscedasticity and volatility clustering are not found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 0.001360and its probability is 97.06% as shown in Table No.5.14. Since the probability is higher than 5%, the H_0 cannot be rejected. Hence, it can be concluded that the residual distribution of HUL Ltd has no volatility clustering and heteroscedasticity.

5.1.12. ITC Ltd.

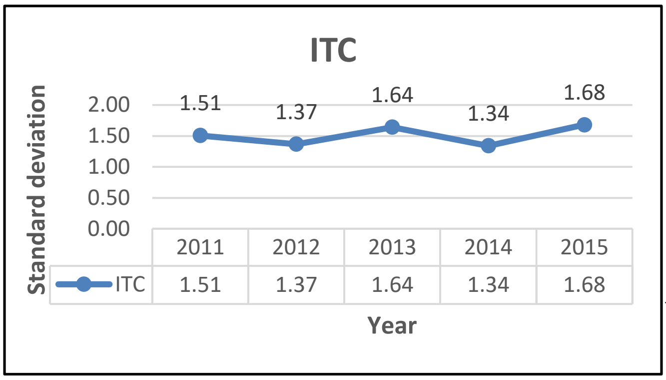


Figure 5.23: Standard deviation of ITC for 5 years

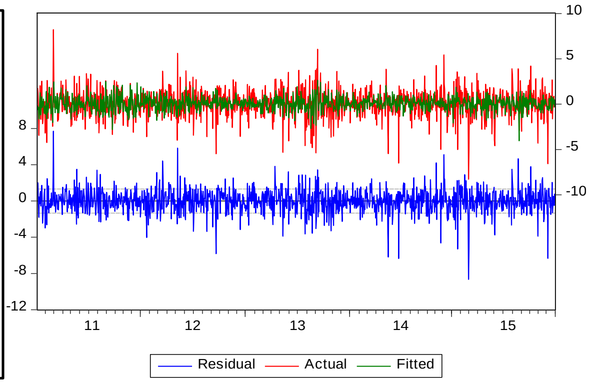


Figure 5.24: Residuals Plot of ITC

Table No. 5.15. Heteroscedastic test (ARCH) of ITC Ltd.

Observed R^2	23.48894	Prob. (Chi-square)	0.000

As per figure 5.23, the standard deviation (SD) in 2011 is 1.51. In 2015, it is 1.68. The standard deviation was increasing in alternate years. The figure showed mild fluctuations year after year, but the SD is very high in all years when compared to the means of the respective years. ITC has a high amount of SD denoting high volatility in returns. Figure 5.24 is the plot of residuals. The residuals shows high clustered volatility. There is conditional volatility for ITC Ltd. It can be noticed from the figure that the volatility is not at a uniform rate. Heteroscedasticity and volatility clustering are clearly found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 23.48894and its probability is 0% as shown in Table No.5.15. Since the probability is less than 5%, the H_0 cannot be accepted. Hence, it can be concluded that the residual distribution of HUL Ltd has volatility clustering and heteroscedasticity.

5.1.13. ONGC

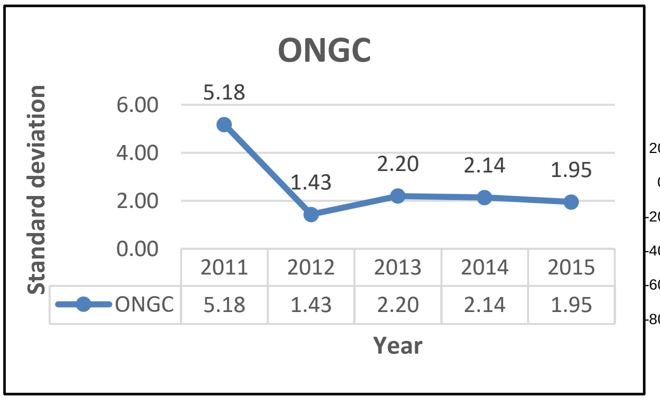


Figure 5.25: Standard deviation of ONGC for 5 years

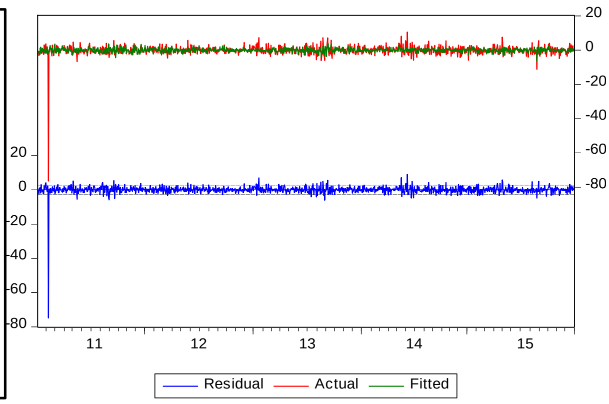


Figure 5.26: Residuals Plot of ONGC

Table No. 5.16. Heteroscedastic test (ARCH) of ONGC

Observed R^2	0.002294	Prob. (Chi-square)	0.9618

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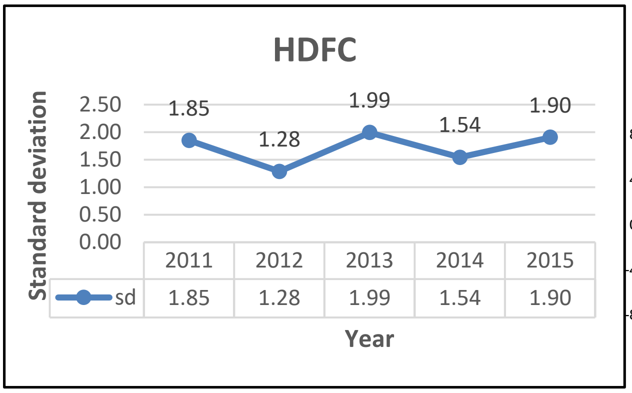
As per figure 5.25, the standard deviation (SD) in 2011 is 5.18. After a sudden decline in 2012 to 1.43, it remained more or less stable for the rest of the years. In 2015, it reached to 1.95. The SD is very high in all years when compared to the means of the respective years. ONGC has a high amount of SD denoting high volatility in returns. Figure 5.26 is the plot of residuals. The residuals shows no clustered volatility. There is no conditional volatility for ONGC. It can be noticed from the figure that the volatility is at a uniform rate. Heteroscedasticity and volatility clustering are not found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 0.002294and its probability is 96.18% as shown in Table No.5.16. Since the probability is higher than 5%, the H_0 cannot be rejected. Hence, it can be concluded that the residual distribution of ONGC has no volatility clustering and heteroscedasticity.

5.1.14. HDFC



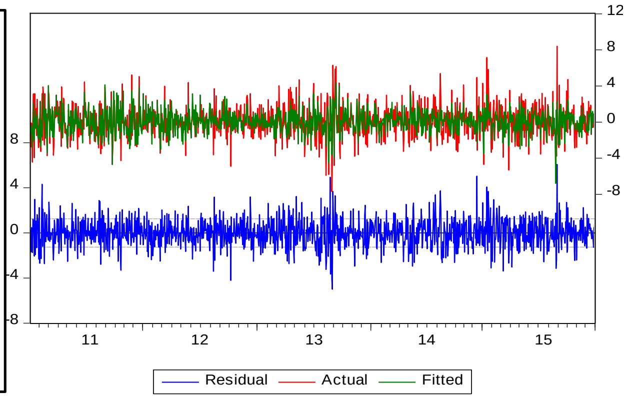


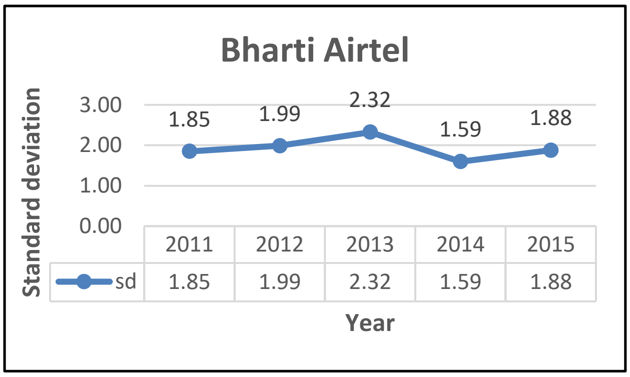
Figure 5.27: Standard deviation of HDFC for 5 years **Figure 5.28: Residuals Plot of HDFC**

Table No. 5.17. Heteroscedastic test (ARCH) of HDFC

Observed R^2	26.02662	Prob. (Chi-square)	0.000

As per figure 5.27, the standard deviation (SD) in 2011 is 1.85. In 2015, it is 1.90. The standard deviation was increasing in alternate years. The figure showed mild fluctuations year after year, but the SD is very high in all years when compared to the means of the respective years. HDFC has a high amount of SD denoting high volatility in returns. Figure 5.28 is the plot of residuals. The residuals shows high clustered volatility. There is conditional volatility for HDFC. It can be noticed from the figure that the volatility is not at a uniform rate. Heteroscedasticity and volatility clustering are clearly found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 26.02662and its probability is 0% as shown in Table No.5.17. Since the probability is less than 5%, the H_0 cannot be accepted. Hence, it can be concluded that the residual distribution of HDFC has volatility clustering and heteroscedasticity.

5.1.15. Bharti Airtel



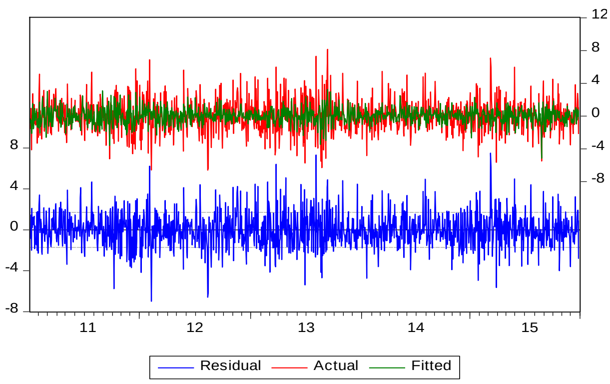


Figure 5.29: Standard deviation of Bharti Airtel for 5 years **Figure 5.30: Residuals Plot of Bharti Airtel**

Table No. 5.18. Heteroscedastic test (ARCH) of Bharti Airtel

Observed R^2	19.18147	Prob. (Chi-square)	0.000

As per figure 5.29, the standard deviation (SD) in 2011 is 1.85. In 2015, it is 1.88. The standard deviation was increasing except in 2014, in which it decreased to 1.59. The figure showed mild fluctuations year after year, but the SD is very high in all years when compared to the means of the respective years. Bharti Airtel has a high amount of SD denoting high volatility in returns. Figure 5.30 is the plot of residuals. The residuals shows high clustered volatility. There is conditional volatility for Bharti Airtel. It can be noticed from the figure that the volatility is not at a uniform rate. Heteroscedasticity and volatility clustering are clearly found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 19.18147and its probability is 0% as shown in Table No.5.18. Since the probability is less than 5%, the H_0 cannot be accepted. Hence, it can be concluded that the residual distribution of HDFC has volatility clustering and heteroscedasticity.

5.1.16. BSE Sensex 30

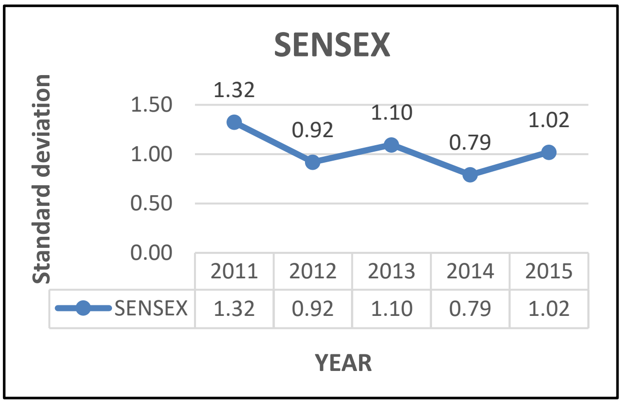


Figure 5.31: Standard deviation of BSE Sensex for 5 years

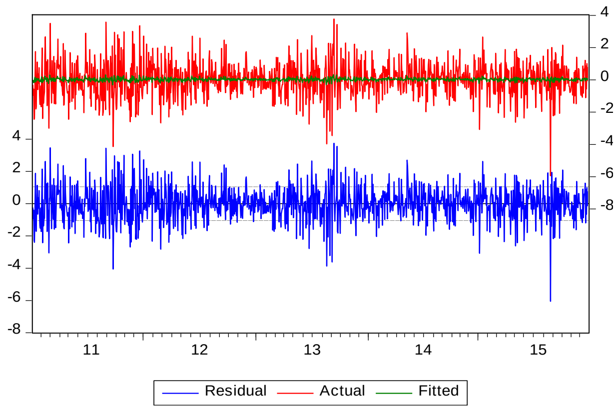


Figure 5.32: Residuals Plot of BSE Sensex

Table No. 5.19. Heteroscedastic test (ARCH) of BSE Sensex 30

Observed R^2	0.195489	Prob. (Chi-square)	0.6584

As per figure 5.31, the standard deviation (SD) in 2011 is 1.32. In 2015, it is 1.02. The standard deviation was decreasing during the period of study. The figure showed mild fluctuations year after year, but the SD is very high in all years when compared to the means of the respective years. Sensex has a high amount of SD denoting high volatility in returns. Figure 5.32 is the plot of residuals. The residuals shows no clustered volatility. There is no conditional volatility for Sensex. Heteroscedasticity and volatility clustering are not found in the plot. When this phenomenon is put to heteroscedastic test, ARCH method, the R^2 value obtained is 0.195489and its probability is 65.84% as shown in Table No.5.19. Since the probability is greater than 5%, the H_0 cannot be rejected. Hence, it can be concluded that the residual distribution of Sensex has no volatility clustering and heteroscedasticity.

Table No.5.20: Normality Statistics of Stocks

SCRIP	skew	Kurt	Jarque-Bera	p-value
Lupin	-0.10	3.89	42.94	0.000
Tata steel	0.07	4.50	117.76	0.000
Tata motors	-12.20	305.74	4762241	0.000
SBIN	-17.15	478.23	11719871	0.000
LT	-2.45	40.25	72888.15	0.000
TCS	0.25	8.18	1396.06	0.000
Reliance	0.01	4.12	64.39	0.000
Adani	0.20	4.75	165.57	0.000
Coal	0.41	7.66	1154.81	0.000
HUL	1.72	17.93	12120.29	0.000
Asian paints	-21.27	634.99	20712797	0.000
ITC	-0.32	5.79	424.84	0.000
ONGC	-14.71	391.87	7851550	0.000
HDFC	0.17	4.36	101.88	0.000
Bharti Airtel	0.24	4.09	73.62	0.000
Sensex	**-0.11**	**4.52**	**122.31**	**0.000**

The presence of skewness in the distribution shows that the distribution is either right tailed or left tailed. In case of positive skewness, most of the returns are above the mean return and hence right tailed distribution. In case of negative skewness, most of the returns are below the mean return and hence left tailed distribution. In a normal distribution, returns will be equally distributed above and below the mean. That is, both sides of the normal distribution is symmetrical. Skewness means asymmetry in the distribution. That is, whether positive or negative, the presence of shewness shows that the distribution is not normal. In Table No.5.20, it can be seen that all stocks, including the Sensex have either positive or negative skewness. Out of the 15 companies, 7 companies are negatively skewed and 8 companies are positively skewed. The market tis also negatively skewed.

Coefficient of Kurtosis of 3 is considered to be normal distribution. From the table, it can be seen that all stocks have a kurtosis of greater than 3 including market. All stocks have an excess kurtosis which make them leptokurtic rather than normal.

The Jarque-Bera statistic for all stocks and corresponding probabilities are given in the table. All the stocks, including the market have the p-value of 0%. It is the p-value of the H_0. Since it is less than 5%, the H_0 cannot be accepted. Thus, the H_0 that, the distribution is normal is rejected. It means all the distributions are not normal, including the market.

6. FINDINGS

The major findings of the study are enlisted below.

1. Stocks under study during the period from 2011-2015 secured a return ranging from -0.002% to 0.12%.
2. The stock Lupin had the highest return of 0.12% during this period.
3. Tata Motors made the lowest return to the tune of -0.002%.
4. All stock returns had greater amount of standard deviation.
5. Stock Tata motors had the highest standard deviation of 3.26%.
6. Stock ITC was having the lowest standard deviation of 1.51%.
7. Coefficient of variation of all the stocks was very high.
8. The return of BSE Sensex, the market portfolio, was 0.02% during this period.
9. On an average, the returns of individual stocks were equal to the return of the market portfolio.
10. All stocks had skewness.
11. Seven stocks had negative skewness, the remaining eight stocks had positive skewness.
12. All the fifteen stocks had excess kurtosis. The BSE Sensex also had excess kurtosis and negative skewness.
13. Out of fifteen stocks, only four stocks had significant correlation with the market portfolio. The other eleven stocks had correlation coefficient less than 0.5.
14. Seven stocks had beta coefficients more than one. Eight stocks' coefficient of beta were less than one.
15. The coefficient of determination of all stocks was lower. It implies that only lower percentage of returns was explained by the market and a large chunk of returns were left unexplained.
16. The average annualized return of the fifteen stocks was 4.57%, of which State Bank of India tops with 40.02%. The lowest annualized return -28.74% belongs to ONGC.
17. The coefficient of determination is lower than 60%. Therefore, betas of the stocks did not explain the stock returns adequately. Beta explained only a part of the returns secured by the stocks. A large part of the returns are left unexplained by beta. Hence, beta is found to be an inadequate measure of linearity. The study did not result in finding any evidences for strong linearity between beta and returns. It is found that beta could explain only part of the stock return and it failed to capture the whole of the return as envisaged by CAPM.
18. The residuals of seven stocks consisting of Tata Motors, SBIN, LT, TCS, Reliance Industries, Asian paints and ONGC were found random.

19. The residuals of three stocks namely, Tata Steel, HDFC and Bharti Airtel were found to have high auto-correlation. The squared residuals of these three stocks were also found to have high auto-correlation. Hence the returns of the three stocks are non-random as their residuals and squared residuals showed interdependence.

20. The residuals of five stocks consisting of Lupin Ltd, Adani ports, Coal India, HUL, and ITC were found random with serial dependence. It was so because, the residuals of these five stocks showed no auto-correlation, but their squared residuals had serial correlation.

21. Stocks had high standard deviation. Hence, high level of volatility.

22. The standard deviation of individual stocks on an average was higher than that of the standard deviation of the market.

23. The residuals of eight stocks consisting of Lupin Ltd, Tata Steel, Adani ports, Coal India, HUL, ITC, HDFC and Bharti Airtel had both the unconditional and conditional volatility. Conditional volatility when measured by ARCH method manifested volatility clustering and heteroscedasticity.

24. Jarque-Bera test statistic of normality for all stocks were higher than the Chi-square critical value. Hence, the test was significant. The p-value corresponding to Jarque-Bera test of normality for all stocks was 0%. Therefore, it was found that the return series of all stocks are not normal.

7. CONCLUSION

The study "Stock Return Behavior of Selected Companies in India" was initiated with a view to study the behavior of returns of selected Indian stocks in terms of their behavior manifested in the form of linearity, randomness, volatility and normality. To enable the study, 15 stocks graded as top traded during 2015-16 listed in BSE were selected. S&P BSE Sensex 30 was being selected as the market portfolio for the study. Data were collected from the official website of BSE. The data were processed and analyzed with the help of the statistical tools such as arithmetic mean, geometric mean, standard deviation, skewness, kurtosis, variance, coefficient of variation, correlation, covariance, beta, R^2, range, auto-correlation, Jarque-Bera test p-value, OLS and ARCH methods.

The study found that the returns on the stocks were varying between -0.002 to 0.12%. All stocks had shown high degree of standard deviation and volatility and low level of average returns, almost very close to 0%. The linearity between return and risk was found to be weak. The study found evidences of volatility clustering and heteroscedasticity. The returns of stocks of all are not random. Some are random, but most are not random. There are some stocks having random, but serially dependent. Similarly the distribution of returns of all stocks were found highly asymmetrical. Many stocks had significant auto-correlation. Stocks are all highly skewed. The return streams had either long left tail or long right tail. The presence of high peakedness mars adversely the symmetry of the return distribution. All stocks had excess kurtosis. To conclude, the study found strong evidences for the presence of skewness (negative/positive) and excess kurtosis in the distribution of returns. Similarly, the study found the elements of weak linearity, non-randomness, non-normality and high volatility in returns.

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