Analysing the volatility of nse indices – emprical study

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Abstract: Stock market volatility forecasting is an emerging trends financial market, since better forecasting influence the FII inflows which intern give impact to Indian economy. In this direction, this paper attempts to analyze the volatility of NSE indices, forecast the index value for the next year and to suggest the strategies for trading. Statistical tools like correlation test, volatility test and method of least squares are used to analyze the data, to study the trends in Index flow. The study forecast the Index value for the next year and found the consistent index among the selected indices.

Keywords: Volatility, NSE Indices, Stock Market Volatility, Forecasting

Introduction

For the past two decades lot of analysis has been done to study the stock market volatility by academicians as well as practitioners with the use of empirical and theoretical investigations. Experts has given different methods of analyzing the stock market volatility out of which the simplest method is use statistical tools like standard deviation or variance of asset returns or indices. There is a model which is used to analyze the stock market volatility is ARCH/GRACH class of models, which are most extensively used in finance. In our study we are using the first method; in addition to that we are also using the method of least squares to forecast the index value for the next year.

Need of the study

A stock index is a bunch of stock grouped together which indicates the performance of different companies listed in it. Stock portfolio is normally compared with the performance of the respective index value where the index value is used to tract the general performance of the industry.

Objectives

1. To study the volatility of NSE indices
2. To forecast the 2012 indices value
3. To frame the trading strategy in NSE indices

Review of Literature

Abhijit Dutta, has done a study on A Study of the NSE's Volatility for Very Small Period using Asymmetric GARCH Models. This paper analyzed the Indian Stock Market experiences volatility clustering and hence GARCH-type models predict the market volatility better than simple volatility

models, like historical average, moving average etc. It is also observed that the asymmetric GARCH models provide better fit than the symmetric GARCH model, confirming the presence of leverage effect.

Takahashi, Katsuyuki, Shoji, Isao conducted a study on An empirical analysis of the volatility of the Japanese stock price index: a non-parametric approach. The objective of the study analyse the stochastic features of volatility in the Japanese stock price index, or TOPIX, using high-frequency data sampled every 5 min. The process of TOPIX is modeled by a stochastic differential equation with the time-homogeneous drift and diffusion coefficients. The result of the estimation suggests that the volatility function shows similar patterns for one period, but drastically changes for another.

Wessel Marquering and Mamo Verbeek conducted a study on The Economic Value of Predicting Stock Index Returns and Volatility. The study analyzed the economic value of predicting stock index returns as well as volatility. Using monthly data, they examined the economic value of a number of alternative trading strategies over the period 1970-2001. The study found that, the economic value of trading strategies that employ market timing in returns and volatility exceeds that of strategies that only employ timing in returns. Most of the profitability of the dynamic strategies, however, is located in the first half of our sample period.

P Srinivasan conducted a study on Modeling and Forecasting the Stock Market Volatility of S&P 500 Index Using GARCH Models. The study attempted at modeling and forecasting the volatility (conditional variance) of the S&P 500 Index returns of United States stock market, using daily data covering a period from January 1, 1996 to January 29, 2010. Based on out-of-sample forecasts and a majority of evaluation measures, the results showed that the symmetric GARCH model does perform better in forecasting conditional variance of the S&P 500 Index return rather than the asymmetric GARCH models, despite the presence of leverage effect.

Methodology

Descriptive research is used in this study to figure out the volatility of NSE indices in Indian Stock Market. The secondary data are collected from National Stock Exchange – Indices like CNX BANK, CNX Infrastructure, CNX IT, CNX FMCG, CNX Auto and CNX Pharma. Statistical tools like correlation test, volatility test and method of least squares are used to analyze the data, to study the trends in Index flow to forecast the 2011-12 Indices.

Analysis & Interpretation

Table No: 01 Statistical study of Banking Sector (CNX Bank)

S.No	Particular	2006-07	2007-08	2008-09	2009-10	2010-11
1	Opening Value	4724.1	4959.7	6608.1	4211.5	9507.8
2	Closing Value	5308.5	6655.0	4133.2	9459.6	11705.5
3	Average Annualized return	-0.3	-0.3	-0.5	-0.1	-0.3
4	Mean value of CNX Bank	5002.4	7639.8	5430.9	7906.4	10828.5
5	Beta	2.1	2.0	1.2	2.4	2.9
6	Standard Deviation	830.7	1485.3	1118.5	1293.4	1108.2
7	Correlation between banking index and NSE index	1.0	1.0	0.9	1.0	0.9

Interpretation: From the above table it is clearly inferred that, the annualized average return for analyzed period is shown a negative value and there is a lowest value exist during the year 2008-09. For the year 2008-09 the index moved 1.2 times of the market movement which shown in the value of beta. The correlation value shows that, the banking index is almost having perfect positive correlation with the market movement since the value is almost nearer to 1.

Table No: 02 Statistical study of Infrastructure Sector (CNX Infrastructure)

S.No	Particular	2006-07	2007-08	2008-09	2009-10	2010-11
1	Opening Value	2600.2	2969.4	4204.5	2374.4	3428.9
2	Closing Value	3099.5	4261.2	2369.3	3422.6	3076.7
3	Average Annualized Return	-0.3	-0.2	-0.6	-0.2	-0.4
4	Mean value of CNX Infrastructure	2692.0	4480.5	3111.0	3453.9	3356.2
5	Beta	1.0	1.2	0.9	0.4	0.4
6	Standard Deviation	380.4	887.6	770.8	300.1	252.3
7	Correlation between banking index and NSE index	1.0	1.0	1.0	0.7	0.5

Interpretation: From the above table it is clearly inferred that, the closing value has increased for all the year except 2008-09 and 2010-11. The Beta value is decreased from 2008-09 to 2010-11 which shows the movement of CNX index along with the market index and the evidence from standard deviation reflects less volatility in the Infrastructure Sector during the year 2010-11 compared to all the selected period. Though the sector shown a negative return throughout the analyzed period, it generated a high mean value during the year 2007-08 and the return as well.

Table No: 03 Statistical study of IT Sector (CNX IT)

S.No	Particular	2006-07	2007-08	2008-09	2009-10	2010-11
1	Opening Value	4460.5	4940.5	3674.9	2379.8	5984.0
2	Closing Value	5180.7	3705.0	2318.7	5856.0	7148.1
3	Average Annualized Return	-0.3	-0.5	-0.6	-0.020	0.1
4	Mean value of CNX IT	4689.4	4691.4	3191.9	4635.8	6472.2
5	Beta	1.6	-0.3	1.0	1.9	1.0
6	Standard Deviation	620.2	520.8	900.3	1117.0	500.0
7	Correlation between banking index and NSE index	1.0	-0.5	1.0	0.9	0.7

Interpretation: From the above table it is clearly inferred that, the value of average annualized return for all the year shown negative value expect the year 2010-11. During the year 2010-11 the mean value reached the highest among the selected period and the value of standard deviation also reached the lowest among the selected period which shows the less volatility. The negative value of beta exists during the year 2007-08 which shows the index movement is opposite to market movement.

Table No: 04 Statistical study of Pharmaceutical Sector (CNX Pharma)

S.No	Particular	2006-07	2007-08	2008-09	2009-10	2010-11
1	Opening Value	2835.1	2646.3	2906.3	2176.2	4020.4
2	Closing Value	2720.3	2928.5	2200.4	4016.9	4535.9
3	Average Annualized Return	-0.4	-0.3	-0.5	-0.1	-0.3
4	Mean value of CNX Pharma	2613.9	2799.9	2753.6	3158.9	4450.6
5	Beta	0.4	0.1	0.6	0.8	0.9
6	Standard Deviation	203.1	139.4	514.5	507.2	368.3
7	Correlation between banking index and NSE index	0.8	0.6	0.9	0.9	0.8

Interpretation: From the above table it is clearly inferred that, the mean value did not shown any big difference during the year 2006-07 to 2008-09 and the average annualized return reached the highest for the year 2008-09. During the year 2007-08 the value of beta, standard deviation and correlation between the index and the market showed the lowest value among the selected period. As a whole the beta value showed that, the index is a defensive index where the value of beta is less than 1 for all the selected period.

Table No: 05 Statistical study of FMCG Sector (CNX FMCG)

S.No	Particular	2006-07	2007-08	2008-09	2009-10	2010-11
1	Opening Value	6036.8	4572.9	5933.7	5117.6	7264.3
2	Closing Value	4724.8	5817.7	5134.7	7273.3	9188.5
3	Average Annualized Return	-0.5	-0.3	-0.5	-0.3	0.1
4	Mean value of CNX FMCG	5249.8	5446.1	5335.2	6580.5	8608.0
5	Beta	0.2	0.6	0.5	1.2	1.7
6	Standard Deviation	417.7	469.3	461.7	724.5	688.7
7	Correlation between banking index and NSE index	0.2	0.9	0.9	0.9	0.9

Interpretation: From the above table it is clearly inferred that, there is an existence of positive annualized return only during the year 2010-11. The correlation value is almost perfect correlation for all the year except the year 2006-07. During the year 2006-07 the value of mean, beta, correlation and standard deviation showed the lowest value among the selected period which reflects the low volatility of the index during that period. In the year 2006-07 the value of mean, beta, correlation and standard deviation showed the highest among the selected period which reflects the high volatility of the index and aggressive movement of index with respect to market movement during that period.

Table No: 06 Statistical study of Automobile Sector (CNX Auto)

S. No	Particular	2006-07	2007-08	2008-09	2009-10	2010-11
1	Opening Value	2231.8	1849.2	1860.6	1346.0	3207.0
2	Closing Value	1970.9	1878.4	1341.9	3206.8	3862.4
3	Average Annualized Return	-0.4	-0.4	-0.5	-0.03	0.1
4	Mean value of CNX Auto	2094.7	2055.2	1436.7	2529.2	3683.7
5	Beta	0.4	0.2	0.4	1.0	0.9
6	Standard Deviation	164.9	149.0	320.5	542.5	339.9
7	Correlation between banking index and NSE index	0.8	0.8	1.0	1.0	1.0

Interpretation: From the above table it is clearly inferred that, the performance of automobile sector shown a drastic change during the year 2009-10 & 2010-11 where the values of good positive response from the average return and the mean value. The volatility of the index is high during the period 2009-10 to 2010-11 which reflects in the high value of standard deviation. In the evident from Beta & Correlation, it is inferred that the index movement is almost in phase with market movement during 2009 to 2011.

Table No: 07 Trading Strategy for CNX Bank indices

The below table shows the strategies that can be used for trading in index. Passive strategy can be used by investors who purchase the stock with the intention of long-term capital appreciation and limited maintenance in which the investors buy a security and typically don't actively attempt to profit from short-term price fluctuations, where as in active strategy investors will typically look at the price movements of their stocks many times a day.

S.No	Year	Active Strategy					Passive Strategy	Difference
		Buy Period	Buy Price	Sell period	Sell price	Return	Return	
1	2006	19.07.06	3428.15	01.12.06	6330.75	84.67	12.40	72.27
2	2007	02.04.07	4959.65	14.01.08	10698.35	115.71	34.20	81.51
3	2008	16.07.08	4726.45	11.08.08	6723.20	42.25	-37.50	79.75
4	2009	01.04.09	4211.45	16.10.09	9526.70	126.21	124.60	1.61
5	2010	25.05.10	8851.75	05.11.10	13268.7	49.90	23.10	26.80

Interpretation: From the above table it is clearly inferred that, in all the year returns from the active strategy is dominating the returns from the passive strategy in which buy and sell periods are different between active strategy and passive strategy. The passive strategy is not suitable for investor where as the speculator always choose to follow active strategy in which they may look for short term profit only not a capital appreciation.

Table No: 08 Correlation Matrix

The below table shows the correlation matrix in which the correlation between the selected index are measured.

	CNX Bank	CNX Infra	CNX IT	CNX Pharma	CNX FMCG	CNX Auto
CNX Bank	1.0	-	-	-	-	-
CNX Infra	-0.5	1.0	-	-	-	-
CNX IT	-1.0	-0.7	1.0	-	-	-
CNX Pharma	-0.7	-1.0	1.0	1.0	-	-
CNX FMCG	-0.5	-0.8	0.1	1.0	1.0	-
CNX Auto	-0.4	-0.2	-0.9	-1.0	-0.7	1.0

Interpretation: From the above table it is cleared that, there is an existence of positive perfect correlation between CNX Pharma & CNX IT sectors and CNX FMCG & CNX Pharma sectors where as positive poor correlation is present between CNX FMCG & CNX IT. In the other way there is a poor negative correlation existence between CNX IT & CNX Bank and CNX Auto & CNX IT where as poor negative correlation exist between CNX Auto & CNX Infra.

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Table No: 9 Statistical Study of Expected Value for the year 2011-12

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The below table shows the expected value of the selected indices for the period 2011-12. By using Method of least Squares the expected value is calculated in which period is taken as X and Indices value is taken as Y. The difference between the actual value and the expected value is calculated and it is listed in the below table.

S.No	Indices	Expected Index Value	Actual Index value	Deviation of actual from expected value	
				Value	Percentage
1	CNX Bank	12129.12	10828.50	-1300.62	-12.0
2	CNX Infra	3539.44	3356.20	-183.24	-5.5
3	CNX IT	6140.14	6472.20	332.06	5.1
4	CNX Pharma	4768.34	4450.60	-317.74	-7.1
5	CNX FMCG	9384.24	8608.00	-776.24	-9.0
6	CNX Auto	3820.70	3683.70	-137	-3.7

Interpretation: From the above table it is cleared that, the actual value of all the selected indexes is greater than the expected value except CNX IT, which shows that the market did not move as it predicted. Actual Index value for CNX IT is greater than expected value which is called as abnormal increment where the index movement is aggressive than it was predicted.

Table No: 10 Calculations for the Volatility Test

The below table shows the consistency performance of the index with the use of Co-efficient of variance tool and volatility test.

S.No	Period	Co-efficient of variation					
		CNX Bank	CNX Infra	CNX IT	CNX Pharma	CNX FMCG	CNX Auto
1	2006-07	0.17	0.14	0.13	0.08	0.08	0.08
2	2007-08	0.19	0.20	0.11	0.05	0.09	0.07
3	2008-09	0.21	0.25	0.28	0.19	0.09	0.22
4	2009-10	0.16	0.09	0.24	0.16	0.11	0.21
5	2010-11	0.10	0.08	0.08	0.08	0.08	0.09
Average of CV		0.17	0.15	0.17	0.11	0.09	0.14
Standard Deviation		0.04	0.07	0.9	0.06	0.01	0.08
Volatility		0.24	0.49	0.52	0.53	0.14	0.56

Interpretation: From the above table it is cleared that, the volatility of the CNX FMCG is very low compared to other selected indexes. Since the consistency is measured in terms of volatility, it is inferred that the consistent of CNX FMCG is very high and CNX Auto having high level of volatility and low consistent.

Findings

- CNX FMCG is considered as a consistent performing index among the selected indexes.
- By using Method of Least Square this study forecasted the index value for 2011-2012 and it was found that the abnormal increase exist in CNX IT index in which the actual index value exceeds expected index value.
- The study analyzed the difference between active and passive strategy for trading and suggest the active strategy for speculators and passive strategy for investors.

Conclusion

It is very important to understand the risk involved in stock market investment for all countries especially developing country like India. The degree of volatility involved in the stock market may influence the investors to demand high premium which leads to create portfolio. The degree of volatility also impedes the flow of FII & DII and disturbs the economic development of a country. This study shows the level of volatility and consistency level of the indexes in Indian stock market. This study concludes that, in the bull phase the investor may earn decent return and the bear phases incurred loss. In the bull phases volatilities were lower than bear phases.

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