

Nifty Volatility Index (India Vix): A Boon Or Bane?

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Abstract

Nifty volatility index is also called as India VIX. This was introduced in March 2008 with a purpose to avail new instrument for trading on it and as a tool of hedging. Further it can also be used to predict the variation in the market ahead of times. Hence this research is taken-up to investigate whether there is any relation between percentage changes in Nifty volatility on daily basis could give a scope to earn daily returns on Nifty-fifty index. The analysis was made for six calendar years starting from 2011 to 2016.

Key Words: Volatility, Index return, Regression, Correlation.

Introduction

Volatility is defined as degree of fluctuation in the stock market and is visualized in its index. When the fluctuations are often shifting from upward direction to downward and vice versa and further highly unpredictable, the stock market is said to be highly volatile and hence the volatility index increases. When the market is consistent the volatility index decreases.

When the market is falling with high rate of fluctuations, investors feel fear of investing in such a volatile market and avoid investing. When market is moving in the upward direction, investors do show interest in the stock market, with a hope that market will further rise, to invest in.

NSE index is the weighted average price index showing the direction of the movement of the underlying stocks of NSE. But the volatility index measures the degree of variation (like a measure of dispersion). More the degree of variation in the market, more is the volatility and vice versa.

The Volatility index also helps to understand the behavioral and psychological aspects of traders and investors. This in turn helps in prediction of NSE price index and its direction to decide buy/sell calls. The traders/investors perceive significant returns when there is more degree of volatility.

Literature Review

Previous research works have discovered the importance of relationship between the volatility index and stock market returns. It was witnessed that, when the expected market volatility increase, the investors/traders demand a higher expected rate of return for their investments and as a result share prices increase and vice versa. This in turn gives scope

to study the scaffold of a comparative relationship between degree in the volatility index and variations in the market index returns.

Whaley (2009) says through a research work that the volatility index increases when market falls radically when compared to that of when market increases. This implies that volatility is significant in decreasing trend of the market.

But Flemming, J., Ost diek, B., and Whaley, R. (1995) in their research work finds a strong but negative relation between changes in the volatility index and the stock market index returns irrespective of the market movements; upward or downward. The same thing is confirmed by Sarwar (2012) in his research work. Kumar (2012) also disclosed from his research a negative association between the India VIX and stock market returns.

However, contrary to the above Guo and Whitelaw (2006) disclosed through their research paper that market returns are positively related to volatility implying more the degree of volatility, more will be the market returns. Bagchi (2012) revealed through hi research a positive and significant relationship between the India VIX and the returns of the portfolios.

Research Questions

From the above literature review, the following research questions are raised:

- a) If the NIFTY volatility index is on the rise due to rally in the upward direction is not a problem but when market is falling, will the volatility increase create a fear complexion for the investor?
- b) What type of contemporaneous relation exists between changes in the VIX and the stock market index return? Is it negative or positive? Is it asymmetric or symmetric? Is it significant?
- c) Does volatility give scope for the emergence of nifty index returns?

Statement of Problem

Based on the above research questions, the statement of problem for the research is that how the percentage of change in the daily nifty volatility (India VIX) affects daily returns from nifty index during 2011-16:

- a) Do these two variables have positive or negative significant correlation?
- b) Does the daily NSE return dependent significantly on percentage of change in the daily nifty volatility (India VIX) index?

Significance of the Study

A lot of research works were carried out on volatility of global or international stock markets and many works revealed that a 'strong negative contemporaneous relation between changes in the VIX and the stock market index returns in almost all the markets'. Volatility index was introduced in India during March 2008, which attracts the behavioral and

psychological aspects of traders and speculators. But the research works on nifty volatility and its impact on nifty index returns and the behavioral aspects of the investors and traders are not much seen. The research paper focus on whether there is significant correlation between the percentage change in the daily volatility index and the daily NSE returns.

Objectives of the Study

The following are the objectives of the study:

- a) To study the relationship, if any, between the percentage change in the daily nifty volatility index and the NSE daily returns
- b) To construct linear regression of NSE daily returns (dependent variable = y) on percentage change in the daily NSE volatility index (independent variable = x) to project the NSE daily returns for the future periods

Research Design

The research frame work for the research paper is sketched as follows:

a) Study and data period

The research paper is to focus six calendar year period namely from 2011 to 2016. Hence pertinent data was collected for the six year period

b) Data type and sources

The research paper is primarily based on secondary data. The major components of data are collected from NSE website.

c) Data collection and classification

The required data in terms of the two variables, namely, percentage change in daily NSE volatility index was collected from NSE directly for the six years from 2011 to 2016. Similarly, to collect NSE daily return, the data on opening price and closing price was collected for the six years separately from the NSE website. The following formula was used to compute the NSE daily return in percentage:

$$NSE \text{ Daily Return in \%} = \frac{(\text{Daily closing price} - \text{Daily opening price}) * 100}{\text{Daily opening price}}$$

The data thus arrived for the two variables are kept in year-wise for six years.

d) Statistical tools

The data for each year was analyzed by the use of simple linear regression with the help of Excel. The output of each year is displayed in the form of six tables as a part of the research paper.

e) Research Hypotheses

The following are the research hypotheses framed to test:

- i. There is significant correlation between the percentage change in the NSE volatility index and NSE daily returns for the selected data period.
- ii. The regression coefficient is positive and significant of y (NSE daily returns) on x (percentage change in the NSE volatility index) regression for the selected data period.

Results of the Study

The results of the research work through data analysis are presented as follows:

In the Table VII, the summary of the findings based on regression and correlation results are presented based on the analytical Tables I, II, III, IV, V and VI shown for the year 2011, 2012, 2013, 2014, 2015 and 2016. **(Refer Annexures)**

It is found that the correlation is insignificant and coefficient of regression is significant but negative. This implies that a strong negative contemporaneous relation between changes in the VIX and the stock market index return

Table VII : Summary of Tables I, II, III, IV, V and VI

Year	Correlation	Adjusted R ²	β	N	Results
2011	0.4236941	0.17616	Y = -0.1304421 - 0.080906 X Y is NSE daily return during 2011 X is Change in Volatility per day in pc	247	<i>Correlation is weak but regression coefficient though significant negative, its influence is just hardly 0.08</i>
2012	0.448212	0.19768	Y = 0.013597 - 0.08253 X	251	
2013	0.437269	0.18793	Y = -0.04578 - 0.08753 X	250	
2014	0.097047	0.00532	Y = 0.004731 - 0.01266 X	244	
2015	0.508855	0.25592	Y = -0.128 - 0.06829 X	248	
2016	0.515609	0.26285	Y = -0.06938 - 0.08709 X	247	

Implications

Based on the above analysis it is found that there is no strong but negative relation between changes in the daily NSE volatility index and the daily NSE index return. This implies that there is inverse relation between the variables, and no scope to visualize any significant NSE index returns hence, one can avoid investing in high volatility times. It can further be implied that volatility cannot be taken as a base for doing investment or trading purpose. Further it works a caution that when volatility is significant, investors and traders should be away from the market.

Scope For Future Research

The following are the suggested topics for future research:

- a) A comparative analysis among the Sensex and Nifty-50 daily returns and with respect to daily changes in their respective volatility indices.
- b) An analytical and comparative study among large cap, mid-cap and small-cap index returns vis-à-vis changes in India VIX
- c) An analytical study on Index returns of BRICS nations' stock markets vis-à-vis changes in their respective volatility indices.

References

- Bagchi, D. (2012). Cross-sectional Analysis of Emerging Market Volatility Index (India VIX) with Portfolio Returns, *International Journal of Emerging Markets*, 7(4): 383–396.
- Flemming, J., Ostdiek, B., and Whaley, R. (1995). Predicting Stock Market Volatility: A New Measure, *Journal of Futures Markets*, 15(3): 265–302.
- Guo, H., and Whitelaw, R. (2006). Uncovering the Risk-neutral Relationship in the Stock Market, *Journal of Finance*, 61(3): 1433–1463.
- Kumar, S.S.S. (2012). A First Look at the Properties of India's Volatility Index, *International Journal of Emerging Markets*, 7(2): 160–176.
- Sarwar, G. (2011). The VIX Market Volatility Index and US Stock Index Returns, *Journal of International Business and Economics*, 11(4): 167–179.
- Sarwar, G. (2012). Is VIX an Investor Fear gauge in BRIC equity markets? *Journal of Multinational Financial Management*, 22(3), 55–65.
- Whaley, R.E. (2000). The Investor Fear Gauge, *Journal of Portfolio Management*, 26(3): 12–17.
- Whaley, R.E. (2009). Understanding the VIX, *Journal of Portfolio Management*, 35(3): 98–105.

Table I: Regression Analysis of NSE Daily Returns on daily changes in Volatility index (VIX) - 2011

SUMMARY OUTPUT - 2011		Ho: $\beta = 0$ H1: $\beta \neq 0$ $\alpha = 0.05$						
Regression Statistics		t = -7.321 is significant BUT NEGATIVE						
Multiple R	0.4236941	Y = -0.1304421 -0.080906 X						
R Square	0.17951669							
Adjusted R Square	0.17616778	<ul style="list-style-type: none"> Y is NSE daily return during 2011 X is Change in Volatility per day in percentage 						
Standard Error	1.03157517							
Observations	247							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	57.04307	57.04307	53.60449	3.51E-12			
Residual	245	260.7161	1.064147					
Total	246	317.7592						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 99.0%	Upper 99.0%
Intercept	-0.1304421	0.065772	-1.98325	0.048456	-0.25999	0.00089	-0.30119	0.040305
% Change in VOLATILITY	-0.080906	0.01105	-7.32151	3.51E-12	-0.10267	0.05914	-0.10959	-0.05222

Table II: Regression Analysis of NSE Daily Returns on daily changes in Volatility index (VIX) - 2012

SUMMARY OUTPUT - 2012		Ho: $\beta = 0$ H1: $\beta \neq 0$ $\alpha = 0.05$						
Regression Statistics		t = -7.91189 is significant BUT NEGATIVE						
Multiple R	0.448212	Y = 0.013597 -0.08253 X						
R Square	0.200894							
Adjusted R Square	0.197684	<ul style="list-style-type: none"> Y is NSE daily return during 2012 X is Change in Volatility per day in PC 						
Standard Error	0.741729							
Observations	251							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	34.43908	34.43908	62.59807	8.31E-14			
Residual	249	136.9903	0.550162					
Total	250	171.4294						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 99.0%	Upper 99.0%
Intercept	0.013597	0.04684	0.290296	0.771831	-0.07866	0.10585	-0.10799	0.13518015
% V Change	-0.08253	0.010431	-7.91189	8.31E-14	-0.10307	-0.0619	-0.10961	-0.05545317

Table III: Regression Analysis of NSE Daily Returns on daily changes in Volatility index (VIX) – 2013

SUMMARY OUTPUT - 2013		Ho: $\beta = 0$						
Regression Statistics		H1: $\beta \neq 0$						
Multiple R	0.437269	$\alpha = 0.05$						
R Square	0.191204	t = -7.65694 is significant BUT NEGATIVE						
Adjusted R Square	0.187943	Y = -0.04578 - 0.08753 X						
Standard Error	0.877285	Y is NSE daily return during 2013						
Observations	250	X is Change in Volatility per day in PC						
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	45.12243	45.12243	58.62878	4.25E-13			
Residual	248	190.8681	0.769629					
Total	249	235.9905						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 99.0%	Upper 99.0%
Intercept	-0.04578	0.055502	-0.82478	0.41029	-0.15509	0.063539	-0.18985	0.098296
% V Change	-0.08753	0.011432	-7.65694	4.25E-13	-0.11005	-0.06502	-0.11721	-0.05786

Table IV: Regression Analysis of NSE Daily Returns on daily changes in Volatility index (VIX) – 2014

SUMMARY OUTPUT - 2014		Ho: $\beta = 0$						
Regression Statistics		H1: $\beta \neq 0$						
Multiple R	0.097047	$\alpha = 0.05$						
R Square	0.009418	t = -1.5169 is NOT significant BUT NEGATIVE						
Adjusted R Square	0.005325	Y = 0.004731 - 0.01266 X						
Standard Error	0.696928	Y is NSE daily return during 2014						
Observations	244	X is Change in Volatility per day in PC						
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	1.117552	1.117552	2.30087	0.130607			
Residual	242	117.5415	0.485709					
Total	243	118.659						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 99.0%	Upper 99.0%
Intercept	0.004731	0.044633	0.106001	0.915669	-0.08319	0.092651	-0.11115	0.120613
% V Change	-0.01266	0.008348	-1.51686	0.130607	-0.02911	0.003781	-0.03434	0.009011

Table V: Regression Analysis of NSE Daily Returns on daily changes in Volatility index (VIX) – 2015

SUMMARY OUTPUT 2015		Ho: $\beta = 0$ H1: $\beta \neq 0$ $\alpha = 0.05$						
Regression Statistics		t = -9.27113 is significant BUT NEGATIVE						
Multiple R	0.508855	Y = -0.128 - 0.06829 X Y is NSE daily return during 2015 X is Change in Volatility per day in PC						
R Square	0.258933							
Adjusted R Square	0.25592							
Standard Error	0.742595							
Observations	248							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	47.39892	47.39892	85.95376	9.71E-18			
Residual	246	135.6559	0.551447					
Total	247	183.0548						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 99.0%	Upper 99.0%
Intercept	-0.128	0.047167	-2.71386	0.007121	-0.22091	-0.0351	-0.25045	-0.00556
% V Change	-0.06829	0.007366	-9.27113	9.71E-18	-0.0828	-0.05378	-0.08741	-0.04917

Table VI: Regression Analysis of NSE Daily Returns on daily changes in Volatility index (VIX) – 2016

SUMMARY OUTPUT 2016		Ho: $\beta = 0$ H1: $\beta \neq 0$ $\alpha = 0.05$						
Regression Statistics		t = -9.41918 is significant BUT NEGATIVE						
Multiple R	0.51561	Y = -0.06938 - 0.08709 X Y is NSE daily return during 2016 X is Change in Volatility per day in PC						
R Square	0.265854							
Adjusted R Square	0.262857							
Standard Error	0.727635							
Observations	247							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	46.97347	46.97347	88.72091	3.53E-18			
Residual	245	129.7158	0.529452					
Total	246	176.6893						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 90.0%	Upper 90.0%
Intercept	-0.06938	0.046323	-1.49778	0.135478	-0.16062	0.02186	-0.14586	0.007102
% Change V	-0.08709	0.009247	-9.41918	3.53E-18	-0.10531	-0.06888	-0.10236	-0.07183

Source for all the tables: Data compiled and calculated from NSE
https://www.nseindia.com/products/content/equities/indices/historical_vix.htm
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