A Comparative Study between the Volatility of Index in IVIX and Nifty 200 Stock Returns

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Abstract: India volatility index, IVIX refers to those psychological and behavioral aspects of traders. The purpose of this paper is to examine the statistical properties of the volatility index of India, to introducing IVIX is to benefit new instruments for trading and hedge through it. India VIX (IVIX) its relationship with the Indian stock market and its predictive power for forecasting future variance. Here an attempt is made to understand the relation between IVIX and market return using t-Test for r.. The study provided sufficient evidence that stock market returns are negatively associated with the volatility Index. The negative correlation prevailing between IVIX and NIFTY 200,would give an opportunity to investors to use IVIX as a directional tool to know the future movement in NIFTY 200, Further, The t-test for slope finds that predictive ability of IVIX is high.

Keywords: IVIX, India VIX, Nifty index, implied volatility

I. INTRODUCTION

Volatility Index (VIX) was introduced in India on March 2008, which is named as (IVIX) India volatility index that captures psychological and behavioral aspects of traders. Volatility Index (VIX) was discussed for the first time in paper by Prof.Robert E Whaley of Duke University, US in 1993.In the same year Chicago Board Options Exchange (CBOE) became the first exchange in the world to introduce a volatility index and named it VIX. Volatility Index (VIX) is a symbolic indicator to manage the risk in financial markets. The purpose of introducing IVIX is to benefit new instrument for trading and hedge through it.

Volatility Index is a measure of market expectation of volatility over the near term. A higher volatility means that a security's value can potentially vary over a large range of values. VIX has been considered by many to be the world's premier barometer of investor sentiment. This means that the price of security's value does not fluctuate dramatically, but change in value at a steady pace over a period of time. The variance in returns also known as volatility, is by its very natures stochastic that indicate the stock market perceived volatility over a period of time. Investor's perception about the index in near term can be indicated using IVIX.VIX is of great advantage in the functions like trading, heding, analyzing and introducing derivatives products in Index. Investor's perception about the index in near term can be indicated using IVIX. It is understood that volatility index will increase when the market price of the index moves abruptly up or down. If there is no abrupt change in the price of market index eventually option prices decreases which results in understand the relation between IVIX and market return and predictive ability of IVIX using statistical tools.

A. Objectives of the study

- To measure the impact of IVIX future on the volatility of NIFTY 200 Index.
- To examine the relationship between the IVIX index and NIFTY 200 index Future.
- To evaluate the persistence of stock price volatility in IVIX index and NIFTY 200 index Future.
- To propose a suitable model for forecasting the volatility of stock prices.
- To Study about volatility index as tool of risk management.
- To identify whether there is any relation between IVIX and NIFTY 200.
- To examine the predictive ability.

B. Need for the study

VIX is an emerging concept in Indian stock market. Volatility index captures the behavioral and psychological aspects of traders in stock market. Investor's perception about the index in near term can be indicated using IVIX. It is understood that volatility index will increase when the market price of the index moves abruptly up or down. If there is no abrupt change in the price of market index eventually option prices decreases which results in decrease in volatility index. Here an attempt is made to understand the relation between IVIX and market return using statistical tools. There is need to understand the predictive ability of IVIX which can be helpful to the investors to take the decision. Investors can use VIX to predict future movement in NIFTY 200, as the volatility index measures the expected volatility in a given market over a 30-day period. An increase in the volatility index alarms the market, since an increase in volatility index means an increase in uncertainty, which results in discomfort for most market participants.

C. Research hypothesis

- H0=There is no significant relationship between IVIX and NIFTY 200.
- H1=There is significant relationship between IVIX and NIFTY 200.

D. Scope of the Study

The study is conducted to understand the extent of relation between India and NIFTY 200.Daily closing values of IVIX and NIFTY 200 were taken to calculate return for the period from April 1st 2013 to March 2018.Standard Deviation and Mean Returns are calculated to know volatility and returns in

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both the indices. Co-efficient of correlation is estimated to know the relation between IVIX and Nifty 200.T-test is carried out to understand the significant of relation.

E. Research Methodology

Daily returns of IVIX and Nifty 200 are calculated using daily closing values for period 5 years that is from April 1st 2013 to March 31st 2018.Mean,Standard Deviation and Beta are estimated using excel. Correlation is estimated to understand the relation prevailing between IVIX and Nifty 200 and r square to know the strength of relation and that two tailed t-test for slope is carried out to know the significance of relationship between IVIX and Nifty 200.

II. REVIEW OF LITERATURE

Singh (2015) provided evidence of time varying, nature of stock volatility in India. Investors aim to invest with higher profitable and less risky investment. Therefore they need to study and analyze stock market volatility among many other factors, before making investment decisions. These results might be largely attributed to the existence of substantial speculative trading, low level of market depth and price limits observed in the Indian market R. Palaniswamy, K. Lakshminarayanan, V. Venkatesh found that the ultimate purpose of introducing IVIX is to avail new instrument for trading on it and hedge through it. It can also be used to predict the change in near month. The primary objective of the research was to find the extent of relationship prevailing `between market and volatility indices. The data collected from NSE, from November 2007 to February 2009, is analyzed using correlation and it resulted in r value of -0.677 which infers 3 VIX contract is necessary to hedge two Nifty contracts. When Indian option market is effectively traded then the correlation between two indices will improve and it will definitely provide reliable reading of market sentiment in future. In future sector specific volatility indices could be constructed to enable hedging in respective sectors. Gangineni Dhanaiah, D Raghunath Reddy, T N L Prasad investigated the contemporaneous negative and asymmetric relationship between Volatility Index – Market return. It is found that there exists a 12 significant inverse relation between movements in India VIX and movements in NIFTY. Further, the results suggest that relation between rates of change in the India VIX and asymmetric and statistically significant. Thus India VIX acts as a measure of investor's fear of the downside as international studies establish. This contemporaneous negative asymmetric relationship can be utilized for hedging purpose by market participants.

A. Interpretation

At 5% level of significance, the critical value using t-distribution is lesser than the computed value. There is significant relationship between IVIX and Nifty 200 all the five financial years .This is implies that when the volatility of IVIX is high, there is volatility in NIFTY 200 index.

B. Interpretation

At 5% level of significance, the critical value using t-distribution is lesser than the computed value. There has been significant relationship between IVIX and Nifty 200 at 5% level of significance. Though in the negative direction .This implies that analytical ability of IVIX is significant.

- The empirical data analysis provided sufficient facts that stock market returns are negatively related with the India Volatility index.
- IVIX provides a reliable estimate of the expected Stock market volatility, which is a vital piece of information investment decision such as asset allocation and hedging risks. India VIX is used as a great tool for hedging risky positions in a fluctuating stock market.
- In 2013-2014, 2014-2015, 2015-2016, 2016-2017 IVIX gave –Ve return & Nifty 200 gave –Ve ruturn value. In 2017-2018 the year IVIX gave +Ve and Nifty 200 also gave +Ve returns.
- It is estimated that, there is difference between standard deviation of IVIX and Nifty 200.They are not equal. The IVIX and standard deviation from the mean is high in the year 2017-2018.it Shows that they have not been stable because there has been high volatility.
- It is noticed in 2013-2014(r=-0.36),2014-2015(r=-0.47),2015-2016(r=-0.68),2016-2017(r=0.66) and 2017-2018(r=-0.49),there is a moderate negative relationship between IVIX AND nifty 200.In 2015-2016(r=0.68),there is strong negative relationship between IVIX and Nifty 200,hence it is understood that the negative correlation prevailing between IVIX and Nifty 200 would give an opportunity to investors to use IVIX as a directional tool to know the future movement in NIFTY 200. There has been significant relationship between IVIX and NIFTY 200 though in the negative direction, at 5% level of significance. This implies that when the volatility of IVIX is high there is instability in NIFTY 200 index. This is an important tool to alert the inverstors. when the IVIX low, it implies that investors are optimistic rather than fearful in the market, which indicates that investors recognize low possible risk.

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TABLE I
ANALYSIS OF EXTENT AND STRENGTH OF RELATIONSHIP BETWEEN IVIX AND NIFTY 200
CALCULATED VALUES FOR IVIX AND NIFTY 200

Values	Mean	SD	SE	Beta	R value	R2 value
Calculated Values for 2013-2014						
IVIX	-0.123	8.1	0.52	-0.902	-0.36	0.507
NIFTY 200	-0.33	6.4	0.41			
Calculated Values for 2014-2015						
IVIX	-0.403	8.43	0.54	-0.931	-0.47	0.512
NIFTY 200	-0.296	6.48	0.41			
Calculated Values for 2015-2016						
IVIX	-0.134	9.14	0.58	-4.215	-0.68	0.362
NIFTY 200	-0.44	6.46	0.41			
Calculated Values for 2016-2017						
IVIX	-0.45	7.71	0.49	-0.929	-0.66	0.596
NIFTY 200	-0.32	6.41	0.41			
Calculated Values for 2017-2018						
IVIX	-0.15	4.65	0.30	-0.350	-0.49	0.247
NIFTY 200	0.03	0.65	0.04			
Calculated Values for 2017-2018						
IVIX	-0.15	4.65	0.30	-0.350	-0.49	0.247

TABLE II
ANALYSIS OF t-TEST
T-TEST FOR R AT 5%

t-Test Statistics	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
	6.22	8.40	14.61	13.99	8.94
Ho	Rejected	Rejected	Rejected	Rejected	Rejected
H1	Accepted	Accepted	Accepted	Accepted	Accepted

TABLE III
AN ANALYSIS OF t-TEST FOR SLOPE REGRESSION STATISTICS FOR 2013-2014

Regression Statistics	
Multiple R	0.367861851
R Square	0.135322342
Adjusted R Square	0.131835738
Standard Error	4.779175199
Observations	250

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	886.4879789	886.487979	38.81208266	1.9863E-09
Residual	248	5664.447865	22.8405156		
Total	249	6550.935844			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.287806161	0.302306233	0.95203515	0.342006089	-0.307608818	0.88322114	-0.30760882	0.88322114
0.899565907	-1.457133678	0.233892299	-6.2299344	1.9863E-09	-1.917802243	-0.9964651	-1.91780224	-0.996465114

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TABLE IV
REGRESSION STATISTICS FOR 2014-2015

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.476925							
R Square	0.2274575							
Adjusted R Square	0.2242386							
Standard Error	4.954564399							
Observations	242							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	1734.603208	1734.6	70.66253	3.782E-15			
Residual	240	5891.450013	24.5477					
Total	241	7626.05322						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.296232758	0.319538188	0.92707	0.354824	-0.33322474	0.92569026	-0.33322470.	92569026
0.699769225	-2.639712887	0.314023462	-8.4061	3.78E-15	-3.25830695	-2.0211188	-3.2583069	-2.02111883

TABLE V
REGRESSION STATISTICS FOR 2015-2016

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.684019627							
R Square	0.46788285							
Adjusted R Square	0.465693067							
Standard Error	4.794494605							
Observations	245							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	4911.586674	4911.586674	213.666356	3.81513E-35			
Residual	243	5585.88438	22.98717852					
Total	244	10497.47105						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.182967852	0.306374331	0.597203594	0.55092751	-0.420520445	0.786456148	-0.420520445	0.786456148
0.922832	-3.977637751	0.272117929	-14.6173307	3.8151E-35	-4.513648665	-3.44162684	-4.513648665	-3.441626837

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TABLE VI
REGRESSION STATISTICS FOR 2016-2017

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.666432788					
R Square	0.444132661					
Adjusted R Square	0.441863815					
Standard Error	3.455574608					
Observations	247					
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	1	2337.481527	2337.481527	195.7526451	4.36466E-33	
Residual	245	2925.543989	11.94099587			
Total	246	5263.025516				
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.185389485	0.220090275	0.842333833	0.400422628	-0.248120979	0.618899949
0.519390582	-3.04179569	0.21740835	-13.99116311	4.36466E-33	-3.470023583	-2.6135678

TABLE VII
REGRESSION STATISTICS FOR 2017-2018

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.497786794							
R Square	0.247791693							
Adjusted R Square	0.244696185							
Standard Error	4.050241631							
Observations	245							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	1313.157314	1313.157314	80.04881189	9.58305E-17			
Residual	243	3986.283116	16.40445727					
Total	244	5299.44043						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.283429923	0.259164559	1.093629177	0.275200569	-0.227065775	0.79392562	-0.2270658	0.793925621
0.453	-3.51538977	0.392912676	-8.94700016	9.58305E-17	-4.289339078	-2.74144047	-4.2893391	-2.741440465

TABLE VIII
T-TEST FOR SLOPE AT 5% SIGNIFICANCE

t-Test Statistics	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
	-6.22	-8.40	-14.6	-14.10	-9.10
Ho	Rejected	Rejected	Rejected	Rejected	Rejected
H1	Accepted	Accepted	Accepted	Accepted	Accepted

III. Conclusion

IVIX provides a reliable estimate of the expected short-term stock market volatility, which is fundamental piece of information for many investment decisions such as asset allocation and hedging risks. Investor's perception about the index in near –term can be indicated using IVIX.India VIX is used as s great tool for hedging risky positions in fluctuating stock market. The negative correlation prevailing between IVIX and NIFTY 200,would give an opportunity to inverstors to use IVIX as a directional tool to know the future movement in NIFTY 200.From t-test it is found that there is significant relationship between IVIX and NIFTY 200 though in the negative direction, at 5% level of significance. This implies that when the volatility of IVIX is high, there is instability in NIFTY 200 index. The t-test for slope it is found that is significant relationship between IVIX and NIFTY 200 at 5% level of significance, though in the negative direction.

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