A study on Volatility Index and its performance in Indian stock market post demonetization

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Abstract: This study is designed for examining the relationship between volatility index and NIFTY and to examine the usefulness of volatility index as a predictor of stock market movement in the post demonetisation phase when the market was in a tense situation. The actual daily data of movement of NIFTY and VIX was analysed on annual and semi-annual basis for the interpretation. This study is on 'Volatility Index and its performance in Indian stock market post demonetization' aimed to justify the correlation and regression amongst the NIFTY and VIX with excellent reliability not only through market sentiments but also through actual NIFTY Values and predictable sentiments. The data used here are the actual date collected from the market covering the period of high and low volatility period at NIFTY and the volatility index as consequence of sudden instability and settling down period.

Keywords: Demonetization, Index, Market, Performance Stock Volatility.

I. INTRODUCTION

Stock market turmoil and lack of clarity on where the stock market is headed is a cause of concern for most investors. Majority of the investors are anxious about the uncertainty of getting the desired rate of return as well as the volatility related to returns.

Predicting the market return of the stocks is difficult however there are established models which can be used for predicting the volatility of returns. Volatility in stock market is used as a statistical measure for measuring the dispersal of returns of the stock or other marketable security. Generally, higher volatility is indicative of greater risk association of the security. For the purpose of predicting the perceived volatility of stock market of a given period of time there are indices developed by the market that capture the movement in stock price volatility. One of the prominent indices that captures the market volatility is the volatility index (VIX).

Volatility index quantifies the market's expectations of volatility in the market over the give period of time. Volatility index provides an estimate amount by which the underlying index is expecting fluctuations over the given time period. VIX measures both upside and downside volatility. Low VIX level hints that the investors in the market are "Bullish" i.e. optimistic and satisfied with the market returns representing no or very low potential risk professed by the investors. While, higher volatility index is indicative of "bearish" nature among investors signifying investor's prescience of significant level of risk and expectation of sharp movement in the market in either direction. Therefore, the VIX rises whenever there is a sharp movement in the index.

Hence, as the Indian VIX values surges, the expected volatility in the stock market becomes higher, and vice versa. This property of Indian Volatility Index brands it as a critical tool for management of risk in stock market.

II. REVIEW OF LITERATURE

According to the analysis done by "Bhanu Pant and Dr. T.R.Bishnoy" (2001) they studied the behaviour of daily and weekly returns of Indian stock market indices for random walk during the period from April 1996 to June 2001.They established that the Indices in Indian Stock Market did not follow the random walk trend.

According to "Andersen Torben, Bollerslev Tim, Diebold Francis, Labys Paul" (January 2002) a framework for integration of high-frequency intraday data into the measurement, modeling, and forecasting of daily and lower frequency return volatilities and return distributions is provided.

"Shenbagaraman" (2003) analysed the effect of introduction of derivatives on the spot market volatility. This study described that the amplified volatility of the Indian stock market was due to that surge in the volatility of the US market referring to a dependence on the same.

According to "Nath and Verma" (2003) they studied the interdependence amongst the major three stock markets in south Asia namely India (NSE-Nifty) Taiwan (Taiex) and Singapore (STI) by use of bivariate and multivariate co integration analysis tools in order to model any linkages that could be found among the stock markets. However, no co -integration was found for the entire period examined (daily data from January 1994 to November 2002). Hence they concluded no long run equilibrium existed among the three stock exchanges.

According to "Thenmozhi M. and Chandra Abhijeet" (2013) Their work analyses the presence of an asymmetric relationship between the India Volatility Index (India VIX) and actual stock market returns, it reveals that Nifty

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returns have a negative relation with the India VIX levels; they also revealed that in the cases of higher upward movements of the market, the returns on NIFTY and VIX tend to move independently of each other.

According to "Srinivasan" (2014) the study tries to investigate the progression of causality between economic enhancement and stock market movement in the Indian scenario. Employing the co-wire and causality tests on the time period from June 1991 to June 2013, this inspection provides a long-run concordance connection amid the economic development and stock market growth indicators in India.

As per Hariharan Cr., India is a highly diversified economy. Demonetisation has been applied in many developed countries but it was never attempted on such a highly diversified country, demographically and economically. Hence the need to study the impact of such a movement on Indian economy. Stock market data reflect the economic development in each sector of the country. Average price represents the value of the under study sector. Total traded quantity gives the idea about the impact on manufacturers and the extent to which each stock could be purchased by the consumers in the economy. Total trade represents the direct quantitative result of demand and supply in the economy after the demonetisation. Due to demonetisation, the average price and the total traded quantity of Indian stock market were affected. Hence it is important to assess the changes in the economy after demonetisation to prevent any future complications.

Research Objectives

1. To analyse the association between India Volatility Index (India VIX) and CNX Nifty Index (NIFTY) in post demonetisation phase of Indian scenario.
2. To investigate the performance of Volatility Index as an indicator of the investor's perception and volatility in stock market post demonetization.

III. RESEARCH METHODOLOGY

a. Data type and source

The study is based on secondary data analysis. The required data related to Indian Stock Market have been collected from various sources i.e. National Stock Market (NSE) Bulletins of Reserve Bank of India, publications from Ministry of Commerce, SEBI Handbook of Statistics, Govt. of India.

b. Data collection and period of the data

The required data was collected for the period post demonetization from 2017 to 2019. Historical data of India VIX and Nifty was collected on a daily basis for the given time period for analysis.

c. Data classification and tabulation

The collected data is classified on annual and semi-annual basis and tabulated accordingly.

d. Statistical tools used

For the purpose of analysing the data the following statistical tools are used:

- Arithmetic Mean, median and Mode
- Standard deviation
- Correlation
- Regression

IV. DATA ANALYSIS

Relationship between NIFTY and India VIX

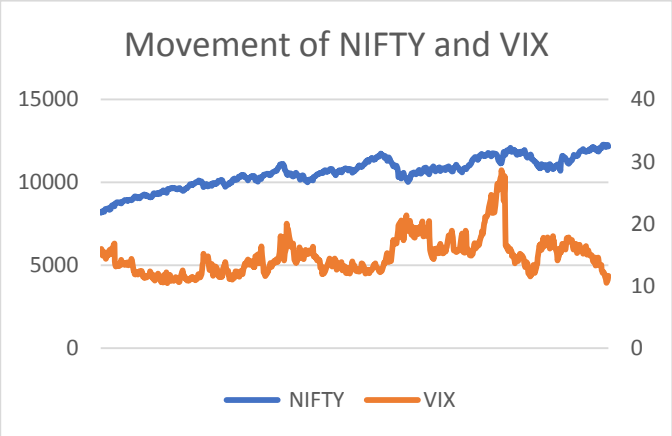

Fig:1 **Relationship between NIFTY and India VIX**

The chart presented above shows that the VIX and NIFTY moved inversely and in almost opposite direction which proves existence of an inverse relationship between the two. Further the degree of correlation between NIFTY and VIX is -0.37. The negative degree of correlation is indicative of a negative or inverse relationship between NIFTY and VIX over the period of study. I anticipated the existence of such relationship as higher volatility prevailing in the capital market is indicative of fear among investors towards high risk associated with volatility in the market. As a result of low inflow of money into consumer market and capital market. This could have resulted to sluggish movement of share price indices. The post demonetisation scenario was full of economic, political and legal uncertainty leading to fear amongst investors. The low average R-squared value 0.31 over the years of study represent VIX having a milder impact on NIFTY over the period.

The fear among the investors was the result of hype created in the economic environment with regards to changing political scenario and policy shift. The traditionally strong saving sentiments of investors and general public changed into the market orientation and further strengthened the formal capital market which might be the reason for continuous sluggish but upward

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momentum that can be observed in NIFTY. This contradiction between the market sentiment and actual market movement explains the lower degree of impact of VIX on NIFTY in the post demonetisation phase where the market was in upward trend.

However, higher R-squared value of 0.65 in the second term of 2018 when the market moves downward indicates that the VIX is more impactful on NIFTY when the market moves downwards because of weak sentiments of investors. Thus, it can be said that VIX is a better barometer of fear in the market when the market is down with high VIX as compared to excitement and the upward market movement with low VIX.

Yearly relationship between NIFTY and India VIX

Year	Market Movement	Correlation	R squared
2017	Up	-0.34015005	0.115702059
2018	Up	-0.43580247	0.189923791
2019	Up	-0.18023815	0.032485791

Fig 2: Yearly relationship between NIFTY and India VIX

Semi-annual relationship between NIFTY and India VIX

Time Period	Market Movement	Correlation	R squared
2017 term 1	Up	-0.92108697	0.848401198
2017 term 2	Up	0.14363843	0.020632
2018 term 1	Up	-0.23951521	0.057367535
2018 term 2	Down	-0.80843999	0.653575213
2019 term 1	Up	0.12892005	0.016620379
2019 term 2	Up	-0.5370463	0.288418728
Average		-0.372255	0.314169176

Fig 3: Semi-annual relationship between NIFTY and India VIX

Result of Regression Analysis:

Daily NIFTY being dependent variable and daily VIX figures as independent variable analysed with the help of regression analysis and their relationship

is established through the available data of NIFTY

Fig:4:Regression Analysis results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	9111.978	157.116		57.995	.000			
	VIX	100.111	10.448	.333	9.582	.000	.333	.333	.333

a. Dependent Variable: NIFTY

and VIX with reference to the Indian secondary market post demonetisation.

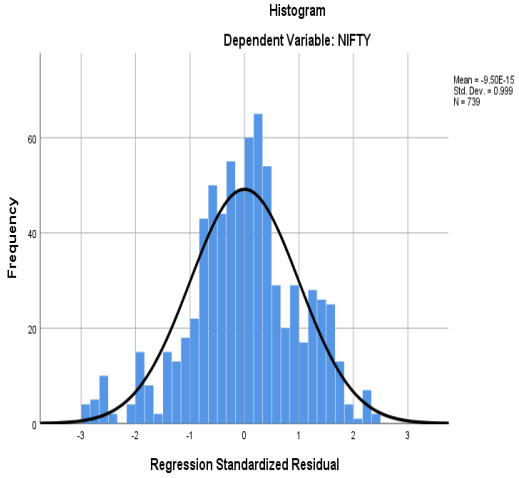

Fig6: Regression Graph

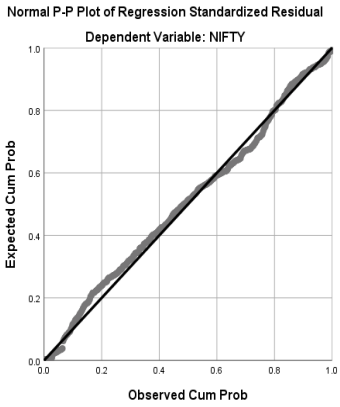

Fig 7: p-plot curve

The above graphs show the normal distribution of data meaning most data points hover close to the mean. This shows that the assumptions for correlational analysis of the normal distribution of data is met and the results are authentic.

Hypothesis:

H0: Slope of regression line not significantly different from zero;

H1: slope of regression line significantly different from zero.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	66906550.851	1	66906550.851	91.813	.000[b]
	Residual	537072063.363	737	728727.359		
	Total	603978614.213	738			

a. Dependent Variable: NIFTY
b. Predictors: (Constant), VIX

Fig 8: ANOVA

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Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.333[a]	.111	.110	853.65529	.111	91.813	1	737	.000

a. Predictors: (Constant), VIX

b. Dependent Variable: NIFTY

Above data related to regression analysis depicts that the following regression line can be drawn in form of Y=a+bX

Y =9111.978+100.111*X

The average cumulative R Square at low degree i.e. 0.111 indicates moderately low impact of VIX on NIFTY showing 11.1% variability in NIFTY predicted by VIX. The result of ANOVA indicates the significance level at 0.00 and rejects null hypothesis confirming the slope of regression line is significantly different from zero. This depicts the significance of regression model for narration of the variation of the dependent variable (NIFTY). With the use of the above regression line the predicted values of NIFTY were calculated for the period under study. The degree of correlation between actual NIFTY values and predicted NIFTY values is -0.372254996.

V. CONCLUSIONS

This study is on 'Volatility Index and its performance in Indian stock market post demonetization' aimed to justify the correlation and regression amongst the NIFTY and VIX with excellent reliability not only through market sentiments but also through actual NIFTY Values and predictable sentiments. The data used here are the actual date collected from the market covering the period of high and low volatility period at NIFTY and the volatility index as consequence of sudden instability and settling down period.

This is visible through change in VIX with the change in NIFTY Index at different degree of volatility and with different pace and volume of transactions of buying and selling of securities at different times under the scope of this study. This study is an effort to analyse different response of investors representing the sluggish but positive movement of NIFTY.

The shortage of liquidity due to demonetisation in market was a temporary phase in the Indian economy but the economy was strong enough the gain confidence of common man to deal with crisis and to think for the alternative means to perform monetary transactions. The form of monetary transactions was changed and with the help of digitalisation of banking activities the economic activities became normal very soon to contribute positively to the economic growth.

Under the period of study the NIFTY was moving downward with high volatility of VIX and over the passes of time the fear of public was controlled and the low volatility prevailed gradually exhibited through lower VIX resulted to upward movement of NIFTY showing the inverse relationship between the two significant indices as significant tools of analysis and prediction of share market movement.

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