

GLOBAL VOLATILITY IMPACT ON INDIAN INDICES – A STUDY

Authors**

KONA BHARATH KUMAR

M.B.A II Year
Matru sri Institute of Post Graduate Studies
Hyderabad.

T. SUDHIR KUMAR

M.B.A II Year
Matru sri Institute of Post Graduate Studies
Hyderabad.

ABSTRACT:

In Indian equity markets there are three National level Stock exchanges which were playing a vital role in the capital markets arena . This analysis had examined after the inception of MCX-sx 40 in the year 2010. How three equity benchmarks i.e., Nifty, Sensex, SX 40 volatility is influencing by global equity index MSCI. Augmented Dicky Fuller Test has been applied for the stationary of the data, regression models ARCH, GARCH, PARCH, EGARCH and TARCH models has been applied on the Heteroskedasticity tested values and found significance by Global equity index MSCI volatility impact on Sensex, Nifty and SX 40 volatility. The Granger Casualty test has been applied on the Jhonson Co-Integrated data and observed that Indian market returns were not affected by the global equity index MSCI. This study is helpful to the FII's, Pension Fund's, AMC's of Mutual funds, QIB's and Higher Network Individuals.

Key Words: MCXSx, MSCI, Nifty and Sensex,

INTRODUCTION:

Volatility is the deviation of prices of assets and it can be of random. Volatility of the index gives the perfect picture of the overall performance and influence the investor's mindset whether to buy or sell the shares. This can be also said as the risk to the investors. It is measured by calculating the standard deviation of the yearly terms over a period of time and there will be the fluctuation. Volatility of asset prices could be of any reason, sometimes information flow into the market will have the impact on the investor. In the market, there are some market predictors who predict the market and gives their opinions for the upcoming period will also affect the market participants. These factors can influence the market at higher rates.

Present financial market sometimes shows sudden movements and stock prices may seem to be too volatile. Volatility of the markets indices is acting as a key indicator to the normal investor who is not knowing the complete market criterion and even they don't know to how to take decisions about the investment in stocks. Volatility of indices will give an exact picture and there investor is having a chance to know the market and also the performance. Volatility is the basic fundamental in order to compare the prices and the performance of any two variables by the consideration of same time period. Portfolio managers help the investor by the observation of the market for several periods and suggest their investors to invest in specific stocks and also mitigate the risk.

REVIEW OF LITERATURE:

Sinha, Pankaj and Mathur, Kritika (2013): Their study examines that the relationship between Multi Commodity Exchange (MCX) and to the International Commodity Exchange – London Metal Exchange (LME) and demonstrates that the linkages in price, return and volatility across the two markets for the five metals through three models - 1) Price- Co-Integration methodology and Error correction Mechanism model, 2) Return and Volatility – Modified GARCH model, 3) Return and volatility – ARMA- GARCH in mean model – Innovations Model. The finding of our paper suggests that there exists a strong linkage across the price, return and volatility of futures contracts traded on MCX and LME respectively. Our analysis is not relevant to this study and it is the study of three national stock exchanges along with the global index MSCI.

Nagaraja, P, Naresh CH: This complete analysis is done based on the share prices of the various selected companies of the BSE Sensex by considering the two economic factors Exchange Rate and Inflation Rate during the period of January 2010 to December 2010. This research attempts to study the relationship of stock returns with macroeconomic variables in Indian context with the help of various measures of volatility like standard deviation, variance, co-efficient of variation were used to measure volatility of stock market return whereas our complete study is done based on the overall performance of three national indices along with the global index MSCI.

Parthasarathy, Srikanth: This analysis investigates the prices and volume effect of index additions to the benchmark Nifty for the period 1999-2010 and evidences significant that positive permanent abnormal returns around index announcement and inclusion. Their study is for the one year period and for one index whereas our study is for the period of four years and covering overall performance of four indices Sensex, MSXsx, Nifty and also the global index MSCI.

Sanjay Tiwari & Komal Gupta : This analysis is to track the volatility of the selected commodities like Gold, Silver and Copper on the basis of empirical finding of three years future prices whereas our study of volatility of the four indices overall performance for the period of 2010-2014. Commodity markets in India are still in their initial stage of development and it has a huge potential due to the fact that Indian economy is agriculture based economy. Commodity markets like stock and foreign exchange markets are of great help not only for those who participates but also for economy as a whole.

Ozturk, Ilhan: Their analysis is to determine that whether trade is influenced by the exchange rate volatility or not and Complete analysis is done by the consideration of developing and developed nations and the results are sensitive to the choices of sample period, model specification, proxies for exchange rate volatility and our analysis is not relevant to this. It is widely believed that increased exchange rate volatility inhibits the growth of foreign trade.

T Mallikarjunappa, Vasantha G: They had examined that the behavior of investors and the participants of different financial markets and the perceptions at the time of contract maturity stage as well as in contract. They have applied Samuelson hypothesis on Indian commodities derivatives market on selected commodities futures from various sectors and found mixed

evidences for Samuelson hypothesis in majority of the commodity futures contracts. Study on price volatility of futures market is an area on which many studies have carried out from two angles; first, the variation in futures prices itself while the futures contract approaches its maturity and second, the impact on spot market volatility due to expiration of its futures contracts and our analysis is not relevant to their study.

N.R.Bhanumurthy, Pami Dua, Lokendra Kumawat: Their analysis is to check that is there any impact of weather and climate shocks on price formation in spot and futures market in India. Data which is available in the MCX AGRI index is used and the results suggest strong co-integration between futures and spot prices for commodities traded in futures market. Changes in rainfall affect both futures and spot prices with different lags. Although there could be other factors that affect the futures prices, after controlling for fuel prices and the results clearly show the transmission mechanism of weather shocks to prices whereas our analysis is not relevant to their study.

Dr. P.Natarajan, E. Nirupama: This analysis is to determine when to buy and when to sell the USD currencies in the futures market and for this study they have considered national index MCX and the Commodity Channel index (CCI). CCI is a versatile momentum oscillator that can be used to identify overbought/oversold levels or trend reversals. The results indicate that CCI serves as a versatile indicator producing a wide array of buy and sell signals. It is useful to an investor to mitigate the risk in trading by the derivative markets and derivatives are useful to reduce volatility and enhance market efficiency and our analysis is not relevant to this analysis.

D. Vasavi, Rasoor Swetha, Bathini Saitha, Indukuri Sarika, Komal S, Amperayana Sreeram: They had examined that whether the national new stock exchange MCX is getting any affect by the other two national indices, for this study they have considered the historical data of three indices and applied stationary test ADF(Augmented Dickey-Fuller Test) and other models and found that all three indices volatility is influenced by each other and this study is helpful to take short term investment decisions whereas our analysis is the study of overall performance of the three national indices along with the global index MSCI.

Bernard Bollen, Brett Inder: This analysis is helpful for an investor to take intraday transaction decisions and also helpful to perform well in daily transactions by the estimation of daily realised volatility in financial markets comparison to the the estimators. An empirical analysis of the VARHAC daily volatility estimator employing intraday transaction returns concludes that this estimator performs well in comparison to other estimators cited in the literature whereas our analysis is not relevant to their study.

Prof. R. Palaniswamy, K. Lakshminarayanan, V.Venkatesh: This analysis is the study of relationship between market and volatility indices. Historical index data of NSE is used for the analysis and applied correlation and found that it is necessary to judge two nifty contracts is inferred by 3 VIX contracts. Our analysis is the study of three national indices along with the global index MSCI and their impact on each other.

OBJECTIVES:

- 1) To know the Volatility of Indian benchmarks with Global Index.
- 2) To know the benchmarks deviation impact on other Indices along with the MSCI.
- 3) To find the Intra Volatility impact on Indian benchmarks.
- 4) To find the MSCI is influencing the Indian benchmark returns.

Hypothesis:

Ho → Accept → Null Hypothesis: MSCI Fluctuation change impacting the benchmark fluctuations of Indian market.

H1 → Reject → Alternate Hypothesis: MSCI fluctuation change not impacting the benchmark fluctuations.

NEED: The study of the overall historical volatility of three indices along with the Global index MSCI has been considered by us. In this area most of the research has been done by various research scholars to measure the implied volatility, historical volatility and realized volatility. By analyzing the previous research articles and thesis we have observed that there is a gap where how global markets volatility is having the influence on Indian major equity stock indices after the inception of MCX-Sx stock exchange.

SCOPE: This analysis is done based on the historical data of the four indices Nifty, Sensex, Sx-40 and the Global index MSCI. Here the complete analysis is focusing on the overall historical volatility of the four indices after the inception of national equity exchange Sx-40. The emphasis of the analysis is to measure the effect of indices volatility and not to measure the returns of the index by the consideration of historical data from 1 April 2010 to 31 December 2014.

EMPIRICAL STUDY:

Nifty, Sensex, MCX-Sx, MSCI and Volatility.

RESEARCH METHODOLOGY: The analysis has been done on secondary data by using descriptive statistics tools.

Volatility: Standard Deviation measures the dispersion of a set of data points from its average. The more disperse (spread out) the data is, the higher the deviation. This deviation is referred by traders as volatility.

$$\text{VOLATILITY} = (\text{sqrt}(\text{SD}/\text{period}))$$

Augmented Dickey–Fuller test (ADF): The testing procedure for the ADF test is the same as for the Dickey–Fuller test but it is applied to the model

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \dots + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t,$$

where α is a constant, β the coefficient on a time trend and P the lag order of the autoregressive process.

Variance: The variance (σ^2), is defined as the sum of the squared distances of each term in the distribution from the mean (μ), divided by the number of terms in the distribution (N).

$$\sigma^2 = \frac{\sum X^2}{N} - \mu^2$$

Granger causality test: The Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another.

$$(GDP)_t = \alpha + \sum_{i=1}^m \beta_i (GDP)_{t-i} + \sum_{j=1}^n \tau_j (SP)_{t-j} + \mu_t \quad (1)$$

$$(SP)_t = \theta + \sum_{i=1}^p \phi_i (SP)_{t-i} + \sum_{j=1}^q \psi_j (GDP)_{t-j} + \eta_t \quad (2)$$

LIMITATIONS:

- MSCI has been considered as a Global equity index
- To measure the impact of volatility except index no other economic variables were considered which can influence the stock indices.

DATA ANALYSIS:

To know the Volatility of Indian benchmarks with Global Index.

Indices	Standard Deviation	Period	Volatility
Sensex	20254.15	1 Apr 2010- 31 Dec 2014	4.134
MCXSX	11507.76	1 Apr 2010- 31 Dec 2014	3.116
Nifty	6247	1 Apr 2010- 31 Dec 2014	2.297
MSCI	50.9828	1 Apr 2010- 31 Dec 2014	0.206

- The above Volatility table depicts the volatility of benchmarks. Historical data has been collected from 1st April 2010 to 31 December 2014.
- Sensex volatility is observed higher than the other indices followed by SX-40 and Nifty.
- The global equity index volatility is lower than the Indian benchmark volatility.

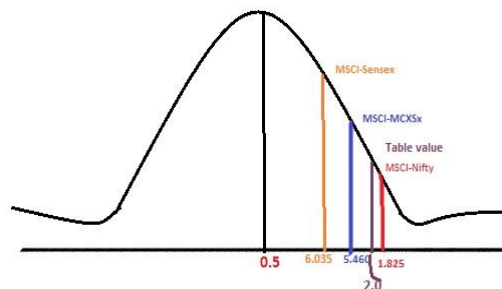
Variance: The variance analysis has been applied with Global equity index to Indian benchmarks and the variance is found to be similar with Nifty and Sensex but whereas larger variance has been observed with SX-40 which indicates that the expected value is spread with the MSCI and MCXSX.

Variance	
Sensex-MCXSX	0.518078232
Nifty-Sensex	1.685778389
Nifty-MCXSX	0.33477654
MSCI-MCXSX	4.233852148
MSCI-Nifty	2.187541229
MSCI-Sensex	2.187541229

- To know the benchmarks deviation impact on other Indices along with the MSCI.

T-Test MSCI BSE	Calculated value	Table Value	Sig/Non significant	Null Hypothesis
T-Test MSCI BSE	6.03573E-31	2.0025	Non Significant	Rejected
MSCI-Nifty	1.82531E-29	2.0025	Significant	Accept
MSCI-MCXSX	5.46026E-31	2.0025	Non Significant	Rejected

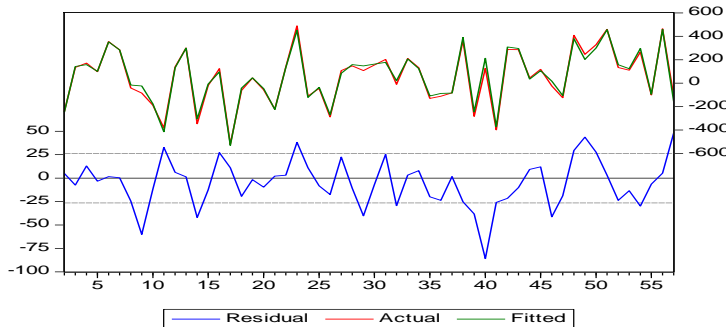
- T-Test has been applied on the standard deviation of Indian equity indices such as Sensex, Nifty and SX-40 with global equity indices MSCI. The Null Hypothesis had rejected to Sensex and SX-40 because the calculated values were found to be more than table value and accept the alternative hypothesis.
- Nifty volatility is getting influenced by MSCI volatility change because Null hypothesis is accepting the calculated value had fallen in significant region where the value is 1.825 which is less than the table value 2.0025(i.e., $1.825 < 2.0025$) and reject the alternative hypothesis H1.



- To find the Intra Volatility impact on Indian benchmarks.

ARCH Test: Heteroskedasticity test has been applied on the Augmented Dicky-Fuller test moulded stationary data on the probability is found to be significant between Nifty and Sx-40.

Residual Test: The Residual test depicts the picture of volatility of Nifty and Sx-40 and the graph shows that fluctuations is trend line is above the fitted line. Hence that the volatility is getting influenced by the external forces.



Interpretation: Regression models of ARCH,GARCH,PARCH,TARCH and EGARCH probability value found to be significant which indicates that Nifty volatility is having a stronger influence on the Sx-40 volatility. The best model is observed.

Regression Models:

	Nifty-Sensex	Nifty-MCXSx	Sensex-MCXSx	MSCI-MCXSx	MSCI-Nifty	MSCI-Sensex
Heteroskedasticity Test Probability	0.0001	0.0001	0.001	0.0001	0.001	0.001
ARCH Probability	0	0	0	0.0001	0.0018	0.0071
AIC	8.527	9.4049	11.412	4.349903	4.3427	4.3459
SIC	8.6355	9.513401	11.52051	4.458404	4.12	4.4544
HQNC	8.5691	9.446966	11.45407	4.391969	4.3847	4.388
GARCH Probability	0	0	0	0	0	0
AIC	8.5182	9.440614	11.22075	4.150188	4.1105	4.1371
SIC	8.6267	9.585282	11.36542	4.294856	4.2551	4.2818
HQNC	8.5602	9.496702	11.27684	4.206276	4.1666	4.1932
TARCH Probability	0	0	0	0.6701	0.002	0
AIC	8.5594	9.261485	11.28876	4.231786	4.223	4.2303
SIC	8.704	9.44232	11.4696	4.412621	4.4038	4.4111
HQNC	8.6155	9.331594	11.35887	4.301895	4.2931	4.3004
PARCH Probability	0	0	0	0	0	0
AIC	8.6167	9.37663	11.45407	0.0285	4.37	4.3501
SIC	8.8337	9.593632	11.67108	4.1159	4.5965	4.4566
HQNC	8.7009	9.460761	11.53821	4.3329	4.4636	4.3926
EGARCH Probability	0	0	0	0.1604	0.0051	0
AIC	8.5515	9.241469	11.45209	15.11	4.1338	4.3501
SIC	8.6961	9.422304	11.63292	15.18	4.3147	4.4586
HQNC	8.6076	9.311578	11.5222	15.47	4.204	4.3922
Best Model	ARCH	EGARCH	GARCH	PARCH	GARCH	GARCH

- To find the MSCI is influencing the Indian benchmark returns.

The Johenson Co-Integration test has been applied on ADF Stationary data between MSCI and Nifty, Sensex, MCXSx. The log likelihood Rank models were observed in Decreasing trend in all linear models along with two different alpha levels. Hence the data is found to be co-integrated between MSCI and Nifty.

Data Trend:	None	None	Linear	Linear
Rank or	No Intercept	Intercept	Intercept	Intercept
No. of CEs	No Trend	No Trend	No Trend	Trend
Log Likelihood by ICR Model				
Series: DMSCI DNIFTY ICR Model				
0	-504.3091	-504.3091	-504.2215	-504.222
1	-488.5451	-488.5244	-488.5227	-486.739
2	-480.2579	-478.329	-478.329	-475.895
Series: DMSCI DSENSEX by ICR Model				
0	-566.7508	-566.7508	-566.6638	-566.664
1	-551.2702	-551.2203	-551.219	-549.545
2	-543.3326	-541.337	-541.337	-538.86
Series: DMSCI DMCXSX by ICR Model				
0	-537.0899	-537.0899	-536.9998	-537
1	-521.758	-521.7355	-521.7336	-519.987
2	-513.923	-511.6487	-511.6487	-509.148

The Granger Causality test has been applied on the co-integrated data of MSCI to Sensex, Nifty and Sx-40.

Pairwise Granger Causality Tests	Obsevrations	F-Statistics	
DNIFTY does not Granger Cause DMSCI	54	2.29078	0.1119
DMSCI does not Granger Cause DNIFTY		0.38189	0.6846
DSENSEX does not Granger Cause DMSCI	54	2.04447	0.1403
DMSCI does not Granger Cause DSENSEX		0.39720	0.6743
DMCXsX does not Granger Cause DMSCI	54	1.80350	0.1755
DMSCI does not Granger Cause DMCXSX		0.37288	0.6907

The Null Hypothesis is accepted because MSCI does not Granger Cause Nifty, Sensex, Sx-40 during the analysis period which indicates that the Global Equity Index is not impacting the Indian Equity market returns.

FINDINGS:

- 1) The volatility of Sensex is found to be higher than Sx-40 and Nifty during the analysis period.
- 2) The variance of volatility with global equity index to Sx-40 is found to be higher than the Sensex and Nifty. The analysis found that the variance of Nifty and Sensex with MSCI is found to be similar.
- 3) The MSCI volatility change is having the impact on Nifty, standard deviation but whereas in the same period it is not having significant to Sensex and Sx-40.
- 4) MSCI volatility is influencing the equity benchmarks i.e., Sensex, Nifty and Sx-40 all the regression models were found to be significant along with the Heteroskedasticity test, probability value.
- 5) MSCI Global equity indicator is not causing the Indian equity markets returns even though their volatility is getting influenced during the study period i.e., April 2010 to 31 December 2014.

CONCLUSION: I conclude the analysis of Global equity benchmark volatility is influencing on Indian equity benchmarks during the study period. Despite of different volatility figures of the Indian benchmarks, global equity indicator is having a stronger influence on the fluctuation of Indian benchmarks, global equity indicator is having a stronger influence on the fluctuation of Indian benchmarks such as Sensex, Nifty and Sx-40. The analysis had observed that the Indian markets returns were not caused by the global market index during the study period. Overall study has been emphasized after the inception of MCX Sx equity stock exchange in India i.e., 1 April 2010 to 31 December 2014. The global equity benchmark volatility is having a stronger influence on Indian benchmarks but their returns were not affected during the study period. Hence there is a further research is recommended in the Indian benchmarks volatility by considering various economic tools of Micro and Macro level along with the Global equity index MSCI.

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