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Contents

April - June 2020, Vol. XVII, Issue No. 2

Articles

Impact of Demonetisation on the Volatility and Returns : NSE Sectoral Indices

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Abstract

The research paper investigates the influence of 'Demonetisation' announced by the Indian Prime Minister Narendra Dass Modi, after the marketing hours of the Indian equity market on 8th November 2016. Though demonetisation is not new to the Indian equity market, this announcement had severe hiccups on the day- to- day life of the citizens of India and the same reflected in the Indian equity market too. This study reveals the nature and extent of the impact on the returns of the sectoral indices of the Indian equity market and its volatility that occurred around the announcement of Demonetization. Price movements of Nifty index and other sectoral indices of NSE were taken into account to know its impact on the announcement. The data pertaining to the price movements for 30 trading days pre and post announcement were used for analytical purpose. The results revealed that the volatility was extremely high, post-event compared with the level of volatility prior to the demonetisation announcement. The sectoral indices too were found to have delivered negative returns during the post-demonetisation event.

Keywords : Volatility, Returns, Demonetization, Equity Market, NSE

S tock market and volatility is an inseparable combo that tends to dance for every micro and macro events ensuing in the home country, subsequently affecting across the globe. The Indian equity market is also not an exceptional one for this universal phenomenon. The sudden policy shock unnerved by the Government of India on 8th November 2016, at 20.15 IST made by the Indian Prime Minister Narendra Das Modi. On the unexpected announcement that, from the midnight of the day, the 500 and 1000 denominated Indian currency notes would no longer be the currency with legal tender values. This announcement has sent shockwaves to the entire nation and even parts of the world. The rationale put forth by the Government officials for such a sudden and shocking move was that it would help them to tackle and curb black money, have a check on the terror funding (or Red Money), eliminate money laundering and fake money issues and motivate people to adapt on the online financial transactions. This artificial disruption to the flow of money has developed severe hiccups in the day to day transactions of the business. Though demonetisation event is not new to the country which had two earlier experiences (the first was on 12th January 1946 and the second one on 16th January 1978), the scale of this announcement was quite staggering, as these notes represented roughly 86 per cent of the total value of the currency which was in the circulation of the country(as per the RBI press release, the total banknotes in circulation valued to Rs16.42 trillion, of which Rs 14.18 trillion were 500 and 1000 notes which were declared as currencies with no legal tender values), an economy in which it is estimated that more than 90 per cent of the transactions are dealt in cash. The RBI announced the citizens of India to deposit their demonetised currencies in the banks and post offices, by following some protocols to exchange their currencies like showing their valid ID proof and with a restricted limit on the exchange of currencies for their withdrawals. The individuals were initially allowed to withdraw only INR 2000 per day and subsequently increased to INR 4000 per day with the weekly limit of INR 20000 per week during the initial phase of the demonetisation. This added more shock and had developed a severe impact on the day to day life of the residents on their purchases and business activities in the country. The purchasing power of the people has been affected due to the non- availability of cash and led to a sharp decline in the demand for goods and services in the country. This shock has extended its waves to equity markets too. Reacting to this economic disruption, the Indian equity market has shown its displeasure on the very next trading day of the event since the announcement was made after the market trading hours on 8th November 2016. Due to the frantic selling in the equity market, the Sensex has nosedived by 6 per cent, crashed by 1689 points and the Nifty had lost 541 points with high volatility movement. On marking of the 100 days of demonetisation, the governor of Reserve Bank of India Urjit Patel has commented that the impact of the event is going to be a sharp "V", resulting in a downgrade of growth for a short period of time. This situation has urged both the practitioners and the academicians to have an insight into the impact of this event in the Indian equity market.

Literature Review

Researches, only scanty in numbers, have been conducted on this demonetisation aspect. NithinKumar and Sharmila (2016) had studied demonetisation and its impact on the Indian economy and found that demonetisation has a short term negative impact on the various sectors of the Indian economy and such impacts will be addressed when the new currency notes were heavily injected into the circulation. They concluded that the government should focus on all the issues developed due to demonetisation and trigger the economy to work smoothly. Bharadwa et al., (2017) have analysed the impact of demonetisation in the Indian equity market. They have applied the Sharpe model to construct the optimum portfolio and to assess the risk-return values of the selected stocks listed in NSE. They have found that the demonetisation event has presented a significant negative impact on the Indian equity market. Chauhan and Kaushik (2017) have conducted a study to examine the impact of demonetisation by applying the event methodology. They found that the stock prices were not significantly affected by demonetisation. The result of their study found a short period of downfall in the stock price and noted a very fast recovery in the medium term, and they argued that this could have happened due to the influence of some other micro or macro factors. Masood and Ali (2017) have analysed the nature and extent of volatility that occurred in the Indian stock market due to the implementation of demonetisation in India. Daily closing values of Sensex and Nifty for the period of three months pre and post-event were taken into account for the analytical purpose, and it was found that the volatility has increased considerably during the post-demonetisation period. Rajnish (2017) has conducted a study to know the effect of demonetisation on the estimates of earnings per share (EPS) of the Indian corporate sector. The researcher found that the demonetisation delivered the adverse effect on the EPS estimates for the immediate period, i.e. December 2018 quarter. But he did not find any

negative impact on the EPS estimates for the long term period. Sathyanarayana and Sudhindra (2017) have undertaken a study to know the short term impact of demonetisation on the Indian stock market using SENSEX, NIFTY and BSE100 Index. The study period lasting for only 26 trading days, i.e. from 26/10/2016 to 31/11/2016 and they found a significant impact on the event day on all the three selected indices. They have concluded with a note that the rare event – demonetisation has delivered a negative impact on the returns of the market with an elevated level of volatility during the study period. An attempt was made by Sunil and Shenoy (2017) to understand the medium-term impact of demonetisation on the price behaviour of the selected stocks of the Indian equity market. The closing prices of the selected stocks for a period of two months prior to the event and four months post-event were considered for the study and CAPM method of calculation was used to calculate the returns of the selected stocks. They found that the impact of demonetisation was purely temporary and did not deliver a significant impact on the performance of the stocks selected for the study from the medium-term perspective. A study conducted by Padmavathy et al. (2017)also delivered findings supporting to this point of view. They have examined the demonetisation impact on the stock prices of selected companies listed in NSE. They have employed an event study method and concluded that the execution of demonetisation did not show any negative sentiment in the market from the medium-term perspective and thus did not have any significant impact on the performance of the stocks during the study period. Manpreet Kaur (2017) conducted a study on demonetisation and impact on a cashless payment system and expressed that the cashless system in the economy has many fruitful benefits like less time-consuming, less cost; paperless transaction etc. and he expected that the future transaction system in all the sectors is going to be cashless. Deepika and Swetha (2018) have done a study to know the impact of demonetisation on the price behaviour of 30 top trading stocks of Bombay Stock Exchange and SENSEX by using the event study method.The daily closing prices of selected stocks for both pre and post-demonetisation period were considered for the study. They concluded that there was no significant impact on the price movements of the stock during the post-announcement period when compared with the pre-announcement period. Rao and Kotian (2017) have studied the impact of demonetisation on the Indian economy. They found that the demonetisation has delivered short term negative impact on the Indian economy. They argued that the short term negative impact will fade away as

early as possible and will show the pathway for better structural reforms. Lawrence and George (2018) analysed the impact of demonetisation on the Indian retail sector and found that the selected sector had a short run negative impact and proved that the losses in the short run would outweigh the benefits from long run. Harpreet Kaur and Ravinderjit Singh (2018) have attempted to examine the impact of demonetisation on the Indian banking sector by applying the event study methodology on the stock prices of selected Indian banking stocks. They found that the demonetisation has a significant impact on the share prices of sample stocks which represent the Indian banking industry and the Indian stock market was not so efficient for the demonetisation announcement in terms of the information because the average abnormal returns on the event day were not equal to zero and it has been statistically proved. Pranjal and Sangetha (2019) have conducted a study to analyse the impact of demonetisation on Indian equity market by comparing the performance of the Nifty index during pre and post-demonetisation event. The daily closing values of the Nifty index for the period of six months during the pre and post-event were considered for the study. They concluded that the blow of demonetisation brought a short term downfall in the market because of the negative sentiments among the investors and the demonetisation did not deliver a significant impact in the performance of Nifty index during the medium and long term period. A study by Jawed et al., (2019) found the highest negative abnormal returns on the event day and during the event window period. They also found that the Indian banking sector is the worst hit in the early days of the demonetisation. But Jincy K John et al., (2019) have delivered contradictory findings in their study. They found that the Indian banking sector has delivered a positive return during the post-demonetisation period with a high level of volatility. Sohail and Shahzad (2020) have analysed the short term impact of a shocking episode of "2016 demonetisation" in India by using the estimation window ranges from one week after the announcement to 60 days and have employed ordinary least square method (OLS), Fixed-Effect (FE), Random – Effect (RE) estimation techniques to know the impact. They found that the announcement effect of demonetisation sharply declined the stock prices of the Indian firms during the short term period.Based on our scrutiny, to the best of our knowledge; no study has considered all the sectoral stocks listed in the Indian equity market to know the impact of demonetisation. Among the studies conducted so far in India to know the impact of demonetisation, few of them have taken either NIFTY or SENSEX alone as a parameter for

their study purpose and some of them have taken the stocks which are the constituent stocks of either NIFTY index or SENSEX index for their calculation purpose without giving due importance to the sector-specific impact of the demonetisation event. Hence, in order to fill this gap, we have considered the behaviour of various sectoral indices (which represent the behaviour of respective sectoral stocks) of the National stock exchange of India, to understand the impact of demonetisation event on every specific sectoral index.

Data and Analytical Discussions of the Study

The primary objective of this study is to find out the short term impact of the rare macro event – 'Demonetisation' on volatility and the returns of the various sectoral indices of NSE. In order to achieve this objective, the data relating to the daily closing values of all the eleven sectoral indices of NSE and the broader market index - NIFTY for 30 trading days, pre and post-demonetisation event were taken into account. The NSE sectoral indices taken for the study purpose are NIFTY Bank Index, Nifty Auto Index, NIFTY Financial Services Index, NIFTY FMCG Index, NIFTY IT index, NIFTY Media Index, NIFTY Metal Index, NIFTY Pharma Index, NIFTY PSU Bank Index, NIFTY Private Bank Index and NIFTY Reality Index. Since the demonetisation announcement was made after the working hours of Indian stock exchanges on 8th November 2016, the data was collected from 26th September 2016 to 8th November 2016, to know the impact of pre-demonetisation process and the closing values of the selected sectoral indices were collected from 9th November 2016 to 21st December 2016, to know the impact of the post-demonetisation process. To achieve accuracy and reliability of research analysis, the data has been extracted from the official website of the National Stock Exchange (www.nseindia.com). The effect on the closing values of the selected sectoral indices was observed from Rt = (log Pt – log Pt-1) x 100 (where Rt is the logarithmic daily returns on the selected index for time T, Pt is the closing value of the selected index at time T and Pt-1 is the corresponding closing value at time T-1).

To understand the distributional properties of the indices selected for the study, descriptive statistics like Average, Standard deviation, Skewness and Kurtosis were used. Any financial time series data should be stationary in nature for further analysis. Hence, to test the stationarity of the selected financial time series, the Augmented Dickey Fuller (ADF) Test (Dickey, D.A and Fuller, W.A .1979) and

Phillips- Peron Test (Phillips, P.C.B and Perron, P.1988) were employed. The earlier literature by Banumathy and Ramachandran (2015), Amudha and Muthukamu (2018), Anwar et al., (2019), Tarek and Abdelkader (2019) and Jincy k John and Amudha (2019) revealed that GARCH (1,1) is the best fit model to specify the volatility pattern of the financial time series. Hence, as proved, we have also opted the GARCH (1,1) model (Bollerslev.T 1986) to understand the level of symmetric volatility of the selected sectoral indices. Before applying the GARCH family models to understand the level of volatility, it is important to identify whether substantial evidence of heteroskedasticity exists or not in the data set, selected for the study. Hence, in order to test the presence of ARCH effects in the selected data set, Lag range Multiplier Test method was applied. The mean reversion i.e. the average number of the time period for the volatility to revert to its long-run level, is measured by the half-life of volatility shock and has been calculated by applying: Lhalf= (ln (1/2)) / (ln (α + β)), where α and β are the calculated ARCH and GARCH coefficients and the calculated mean reversion value was used to find out the average number of days taken by the index to revert to its average normal value.

Results of the Study

Table 1 presents the descriptive statistics of the mean return values of all the selected indices of NSE and the NIFTY during the pre and post-demonetisation event. It is interesting to note that except PSU Bank Index, all the selected sectoral indices and NIFTY have delivered lesser returns during the post-demonetisation event when compared with the returns of the pre-demonetisation period and the PSU bank is the only index (0.020601) that was able to deliver positive returns during the post-demonetisation period. The calculated standard deviation values of all the sectoral indices and Nifty during the post-demonetisation period are relatively high when compared with the pre-demonetisation period, indicating that the selected sectoral indices and Nifty were more turbulent after the demonetisation event. The skewness values of all the indices and Nifty were negative except the indices relating to banking sector like Bank Nifty Index, PSU Bank Index and Private Bank Index stating that these sectoral indices were negatively skewed, indicating that more frequently they have delivered a negative performance during the post-demonetisation period. The Kurtosis values of all the selected indices and Nifty during both pre and post-demonetisation period are greater than 3, indicating that

they are leptokurtic in nature and explains that they do not follow a normal distribution. The calculated Jarque –Bera values during both pre and post-demonetisation events are significant at 5 per cent level, also confirmed that the selected series are not normally distributed.

Before applying any statistical tool for analysing the financial time series data, it is necessary to check whether the selected time series data are stationary in nature. Hence, to understand whether the return series of selected sectoral indices and Nifty are stationary in nature, we have applied the ADF test and PP Test to verify the same. Table 2 expresses the calculated test statistic values (Mackinnon one-sided P values) –'At Level' for all the selected sectoral indices of NSE and Nifty during both pre and post-demonetisation period by using the Augmented Dickey Fuller Test (ADF) and Philips Peron Test (PP). The test critical values at 5 per cent level (Test critical values at 5 per cent level – For ADF is 2.981038 & PP is -2.971853 during the pre-demonetisation period and for ADF is -2.976263 and PP is -2.971853 during the post-demonetisation period) are compared with the calculated values. As per the decision rule to confirm that the time-series data of the selected sectoral indices of NSE and Nifty are stationary in nature, it is necessary that the calculated absolute test statistic values must be higher than the absolute test critical values. The calculated values obtained during both pre and post-event of demonetisation at 5 per cent level are compared with the test critical values and found that they are much higher than the respective calculated absolute test critical values at 5 per cent level. Hence, it is confirmed that the sectoral indices of NSE and Nifty selected for the study are free from unit root problem and was observed that they are stationary in nature during both pre and post-demonetisation periods.

Before finding out the level of volatility of the selected sectoral indices of NSE and Nifty by applying the GARCH (1,1) model, it is important to check whether there is substantial evidence for the presence of heteroskedasticity (ARCH effect) in the return series of Nifty and its sectoral indices selected for the study. In order to test whether the ARCH effect exists or not in the residuals of the return series of the indices selected for the study, we have conducted a residual diagnostics test by using the ARCH – LM test in the residuals and the results found are displayed in Table 3. The rule of the game to reject the return series having no ARCH effect is that the calculated F statistic values and observed R squared values must be statistically significant (below 0.05), and the calculated F statistic value must be greater than the

calculated observed R squared values. All the calculated F statistic values of the selected sectoral indices and Nifty during both pre and post-demonetisation event were compared with the respective observed R squared values and found that all the calculated F statistic values are greater than their respective observed R squared values and the probability values in all the cases are below 0.5, which means that they are statistically significant at 5 per cent level. Hence, it is concluded that the return series of the selected sectoral indices and Nifty are showing substantial evidence for the presence of heteroskedasticity (ARCH effect) effect, which demands the application of GARCH family models to specify the symmetric volatility.

As it was demanded, we have applied the GARCH (1,1) model to specify the volatility pattern of the sectoral indices of NSE selected for the study and the results are displayed in Table 4. The sum of calculated coefficient values of lagged squared residuals (a) and the calculated coefficient values of lagged conditional variance (b)for all the selected sectoral indices and Nifty index were positive during both the selected pre and post events and the calculated values of both a and b were found significant at 5 per cent level. The sum of a and b values (the value used to denote the level of volatility) found positive during both the periods (pre and post event). The volatility level was very high in Pharma Index (0.885637) followed by Nifty (0.87753) and IT index (0.819082) during the pre-demonetisation period. Their sum of a and b values was closer to the unity (1) indicating that these indices were more volatile than the remaining selected series. Their mean reversion values, Pharma Index (5.707352) Nifty (5.305613) and IT index (3.473185), confirm that these indices took a longer period to settle down its volatility. The same scenario was repeated during the post-event also. The Pharma index (0.89510) and Nifty index (0.881409) were more volatile, followed by FMCG index (0.868649). Their calculated sum values of a and b is closer to unity (1) indicating that they took more time period to settle down its volatility. The mean reversion values of these indices have (Pharma index: 6.254721, Nifty index: 5.490992and FMCG index: 4.922356) confirmed that these indices were more vulnerable during the post-demonetisation when compared to other selected indices. But it is interesting to note that the sum of calculated a and β values for all the selected indices during the post-event was higher than the pre-demonetisation period indicating that these indices were more volatile during the post-event than the pre-demonetisation period. The demonetisation event has delivered deeper shocks to the market and rattled down

almost all the sectors, witnessed more volatility and took much longer time to settle down during the post period of this rare event.

Conclusion

The selected indices have delivered the worst performance during the post-demonetisation period when compared with the pre-event performance. Except the PSU bank index, almost all the indices have delivered negative returns during this period. This indicated that the traders in the Indian equity market might have had a perception that public sector banks, being the Government undertakings, would be shielded by the severe liquidity crunch since they were deputed to collect the notes which have been declared as the currencies with no legal tender values during the post-demonetisation period. This index was able to manage the worst cash crunch situation, and the equity traders were not so sceptical about the performance of the PSU bank index with respect to the medium term. The calculated standard deviation values of all the selected indices during the post-event were higher than the previous one, which confirmed that the indices were more turbulent during the post-event. The skewness values of all the selected indices were negative except the banking sector index indicating that more frequently the selected indices have delivered the negative performance during the post-demonetisation period. In the process of finding out the volatility of the selected indices, first, we have applied the Augmented Dickey Fuller Test (ADF) and Philips Peron Test (PP) to verify whether the selected time series data were stationary in nature. It was found that the selected indices were free from the unit root problem and confirmed that they were stationary in nature during both pre and post-demonetisation event. In continuance of the process of finding out the volatility, we have checked for substantial evidence existing for the presence of ARCH effect in the return series of the indices by using ARCH - LM test, a lag range multiplier test and we found the presence of heteroskedasticity (ARCH effect) effect in the selected financial time series data and to address it, as demanded; we have applied the GARCH family models to specify the symmetric volatility. The application of GARCH (1,1) model has delivered the results that the selected indices have been volatile during the study period. But it is interesting to note that the sum of a and b values of all the selected indices during the post-event was higher than the pre-demonetisation period indicating that these indices were more volatile during the post-event than the pre-demonetisation period. The mean reversion values of all the selected indices during the post-event were higher than the corresponding values during the pre-

demonetisation period, which confirmed that the demonetisation process has delivered deeper shocks and caused additional volatility in the market, which has demanded longer time period to settle down its fluctuations when compared with the pre-event.

Hence, we conclude that the rare event of demonetisation has delivered negative impact to Nifty index and all other selected sectoral indices of NSE except the PSU banking sector index. Among the selected indices, the PSU banking sector index alone has given positive returns during the post-demonetisation event when compared with the pre-event. We also confirm that the demonetisation has given deeper shocks to the Indian equity market since almost every sectoral index of NSE and the Nifty index have experienced more volatility during the post-demonetisation event as compared with the pre-demonetisation period. This negative shock given by the Indian government by announcing the demonetisation has negatively influenced the Indian equity market during the short run and has considerably increased the asymmetric volatility in the Indian equity market.

Scope for further Research

Research of this kind would help the traders, investors and individuals showing keen interest in developing their financial literacy to fulfil their business and academic requirements. Since we have taken the closing values of the selected indices for 30 trading days before and after the demonetisation this could only explain the short term impact of the event and will not give clarity on the long term effect of the demonetisation event. Similar research with the data for a longer period like 90 or 365 days would address the medium and long term effect of our study.

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APPENDIX

Table 1

Descriptive statistics for the selected Sectoral Indices and NIFTY

Name of the Index	Pre Demonetization process					Post Demonetization process				
	Mean Return	Standard deviation	Skewness	Kurtosis	Jarque-Bera	Mean Return	Standard deviation	Skewness	Kurtosis	Jarque-Bera
Nifty	-0.009247	0.085145	0.086698	3.765156	0.743765	-.0.017126	0.116271	-0.0403468	3.39251	0.979413
Auto index	0.001228	0.123811	0.033147	3.571929	0.226731	-.0.032113	0.200957	-1.039609	4.163130	6.858526
Bank index	-0.001570	0.106019	-.0.335204	3.360157	0.699818	-0.026638	0.138484	0.574309	5.466362	18.56989
Financial Service Index	-0.004151	0.116189	0.047625	3.969171	1.145940	-0.031093	0.132772	-0.133453	3.952723	8.88780
FMCG Index	-0.001140	0.074853	0.564484	3.367499	1.703294	-0.026959	0.126938	-0.366929	3.852061	6.771891
IT Index	-0.011779	0.090596	0.602188	3.952499	1.755442	-0.020601	0.1308177	-1.308177	7.159762	29.17995
Media Index	-0.010942	0.225826	0.601140	3.915901	2.760255	-0.044772	0.242088	-0.392078	3.329572	1.286120
Metal Index	0.033356	0.206329	-0.156065	3.757773	1.886201	-0.001524	0.270833	-0.325870	4.387835	2.840612
Pharma Index	-0.034391	0.153496	-1.090374	4.655469	9.057960	-0.037773	0.130020	-0.608649	3.168093	1.824665
PSU Bank Index	-0.009385	0.231200	-0.150872	3.626581	0.278510	0.020601	0.1308177	1.308177	7.159762	29.17995
Private Bank Index	0.000667	0.111535	-0.321896	3.378918	0.0364787	-0.033737	0.148385	0.065779	3.929149	0.056247
Realty Index	-0.022908	0.392615	-1.133650	5.928959	16.57768	-0.028651	0.424895	-1.112506	3.851131	6.857415

All the Jarque- Bera probability values are significant at 5 per cent lvel.

Table 2

Tests for Unit Root Problem for the selected Sectoral Indices and NIFTY

	Name of the Index	Pre Demonetization process				Post Demonetization process			
		ADF	Prob	PP	prob	ADF	prob	PP	prob
1	**NIFTY**	-5,882018	0.0000	-9.180123	0.0000	-2.19456	0.0000	-5.595690	0.0001
2	**AUTO INDEX**	-6.381431	0.0000	-6,6661842	0.0000	-4.411630	0.0018	-4.601648	0.0011
3	**BANK INDEX**	-5.363520	0.0001	-5.958050	0.0000	-2.685994	0.0089	-7.270579	0.0000
4	Financial Service Index	-5.404886	0.0001	-6.416506	0.0000	-5.137546	0.0003	-6.265765	0.0000
5	FMCG Index	-4.766062	0.0007	-5.125483	0.0003	-2.820755	0.0069	-5.136621	0.0003
6	IT Index	-4.885170	0.0005	-4.879419	0.0005	-4.637563	0.0010	-4.631286	0.0010
7	Media Index	-5.720860	0.0001	-5.764786	0.0001	-5.314548	0.0002	-5.502322	0.0001
8	Metal Index	-4.614992	0.0011	-11.38170	0.0000	-5.472579	0.0001	-5.389657	0.0001
9	Pharma Index	-5.875444	0.0000	-5.874099	0.0000	-1.860353	0.0034	-6.145757	0.0000
10	PSU Bank Index	-5.937030	0.0000	-6.600045	0.0000	-4.637563	0.0010	-4.631286	0.0010
11	Private Bank Index	-5.217435	0.0002	-5.288207	0.0002	-5.368184	0.0002	-6.482383	0.0000
12	Realty Index	-6.442142	0.0000	-6.522943	0.0000	-1.976236	0.0029	-4.774332	0.0007

Test critical values at 5 per cent level – For ADF is 2.981038 & PP is -2.971853 duringpre demonetization period and for
ADF is -2.976263and PP is -2.971853 during post demonetization period.

Table 3

Testing the Heteroskedasticity Effect for the selected Sectoral Indices and NIFTY

Name of the Index	Pre Demonetization process				Post Demonetization process			
	F- statistic	Prob.F	Obs*R-squared	Prob.chi-square	*F-* statistic	Prob.F	Obs*R-squared	Prob.chi-square
NIFTY	4.66882	0.0050	4.53927	0.0048	3.636236	0.0057	3.57478	0.0054
AUTO INDEX	1.86168	0.01841	1.850931	0.0187	1.039088	0.0085	1.038810	0.0084
BANK INDEX	8.10261	0.0077	8.05917	0.0076	2.312235	0.0014	2.286735	0.0013
Financial Service Index	11.9503	0.0074	11.74328	0.0073	13.12462	0.0264	13.57381	0.0247
FMCG Index	14.0067	0.0071	14.00331	0.0069	6.86341	0.0081	6.30023	0.0081
IT Index	2.32941	0.0088	2.22913	0.0087	1.80807	0.0068	1.75303	0.0067
Media Index	3.72092	0.0054	3.65061	0.0052	2.57616	0.0061	2.54711	0.0060
Metal Index	1.242626	0.0027	1.227172	0.0025	4.40052	0.0051	4.36015	0.0049
Pharma Index	7.94201	0.0039	7.84234	0.0037	9.40051	0.0035	9.36855	0.0033
PSU Bank Index	6.40365	0.0044	6.31955	0.0042	1.83807	0.0068	1.75303	0.0067
Private Bank Index	1.039403	0.0085	1.034853	0.0085	1.738039	0.0198	1.714453	0.0185
Realty Index	1.298184	0.0027	1.282623	0.0025	1.19451	0.0076	1.10141	0.0075

Table 4

Volatility Estimation by Using GARCH (1,1) Model for the selected Sectoral Indices and NIFTY

Name of the Index	Pre Demonetization process				Post Demonetization process			
	α	β	α + β	Mean Reversion	α	β	α + β	Mean Reversion
NIFTY	-0.034761	0.912291	0.87753	5.305613	-0.074483	0.955892	0.881409	5.490992
AUTO INDEX	-0.006246	0.527241	0.520995	1.063085	-0.125431	0.970444	0.845013	4.115996
BANK INDEX	-.0.011119	0.522495	0.511376	1.033545	-0.032260	0.813022	0.780762	2.800765
Financial Service Index	-0.016468	0.515614	0.499146	0.99754	-0.035439	0.577475	0.542036	1.131811
FMCG Index	-0.012931	0.520689	0.507758	1.022718	-0.184773	1.053422	0.868649	4.922356
IT Index	-0.260603	1.079685	0.819082	3.473185	-0.101118	0.941973	0.840855	3.998863
Media Index	-0.015090	0.515313	0.500223	1.000644	-0.250230	1.013429	0.763199	2.564965
Metal Index	-0.550462	1.038113	0.487651	0.965177	-0.006945	0.526978	0.520033	1.06008
Pharma Index	-0.369065	1.254702	0.885637	5.707352	-0.164756	1.059856	0.89510	6.254721
PSU Bank Index	-0.015768	0.515758	0.49999	0.999971	-0.201118	0.991973	0.790855	2.95408
Private Bank	-0.018002	0.515218	0.497216	0.992009	-0.410428	0.940441	0.530013	1.091822
Realty Index	-0.008218	0.521340	0.513122	1.038825	-0.044960	0.572373	0.527413	1.08343

*All the values are significant at 5 per cent level

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