Market Efficiency of Indian Capital Market: An Event Study Around the Announcement of Results of Lok Sabha Election 2019

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Abstract

Market efficiency categorizes a stock market into three sections based on the reaction of share prices to private and public information. This paper mainly deals with reactions of stock market dynamics to information in political events considering the impact of result announcement of the Lok Sabha Elections 2019 on the Indian Stock market as reflected in the behaviour of share prices. Taking BSE 100 as the proxy market, daily closing stock prices of the 30 companies listed in BSE SENSEX was used. An estimation window of 120 trading days was taken prior to the event window. The standard Market model was applied to calculate the AAR and CAAR during the event window of 21 days. Further the Augmented Dickey Fuller (ADF) Test for unit root is applied to measure the stationary of the variables and the presence of ARCH/GARCH effect is tested to understand the volatility during the study period. The Runs Test was used to test the randomness of AAR and the paired sample t test was applied to check the impact of the event on the volume of trading. Consistent negative returns were observed following the event. But the absence of volatility and the insignificant results indicated that market efficiency Indian Stock Market is in a semi strong form.

Keywords: semi strong efficiency, AAR, CAAR, ADF Test, Runs Test, ARCH/GARCH, UIH

1. Introduction

Bachelier (2000) in his thesis "Theory of Sepeculation" threw light into the concept of Stock Market Effeciency for the first time. A series of writings by Fama (1965) described efficient market as "a market where share prices move randomly leaving no scope for abnormal returns from information easily accessible to all". This study is an attempt to identify the semi strong form of efficiency of the Indian Capital Market around the announcement of the most anticipated event of 2019 i.e. the announcement of the Lok Sabha election results released on 24th May' 2019. The study is also essential to all listed companies in stock exchange that thrive to improve efficiency and performance of stock markets in developing countries.

Event study is statistical method to gauge the economic impact of an event on the market value of a firm. Its main objective is to examine the market's response to latest information released during an event announcement be examined as the a positive response to a good news as reflected by significant abnormal gains and a negative response to a bad news as reflected by significant abnormal losses determines the strength of the impact of an economic event.

The study uses an event window for the evaluation duration of about -10 to +10 days round the declaration period since we are confirming the semi strong form of Indian capital market which requires the information from any event of economic value to be reflected in the share prices in a very few days. The short time span for the event window will also eliminate the effect of other announcement to be reflected on the price in the long run.

The Cumulative Average Abnormal Returns (CAAR) are also observed for (-3, +3), (-5, +5), (+7,-7) and (-10, +10) days during the announcement to gauge and distinguish between immediate and later impact.

The event for the purpose of the study is defined as the date of announcement of the results of Lok Sabha Elections 2019.

2. Review of Literature

Many studies have been made to examine the semi strong form of the Indian Capital Market around announcement of micro as well macro economic events such as bonus declaration, right issue, stock splits, mergers and acquisitions, changes in government policies, reforms, political events etc.

Nimkhunthod (2007) examined impacts of elections and dissolutions in Thailand on capital market. He observed that election have positive impact on market in the long run. The results were also corresponding to the fact that reaction to bad news is stronger over good news. Gul *et al* (2013) *studied the* impact of political events, natural calamities and terrorism on shares of financial sector in the capital market in Pakistan. The results indicated the sensitivity of the financial and banking sector to such events as market behaves negatively to such events on national and international front. Ikbal *et al* (2013) examined the impact of political strikes on stick market of Bangladesh. It was observed that stock returns respond negatively to political strikes and the response become more pronounced with the rise in frequency of the political events. Suresha & Chandrashekara (2016) stated the Indian stock market efficient in its semi strong form as they observed existence of significant positive abnormal return on announcement day of bonus whereas negative abnormal return were observed for stock split and rights issue event. Iyengar *et al* (2017) also observed the Indian Stock Market as semi strong effeceient. They observed that US elections offer no scope for consistent abnormal returns to the IT sector, BFSI and logistics sector. Hira (2017) observed that political instability had a negative relation with stock market indices. He used the ARDL cointegration model to check the long run relationship and the ECM (Error Correction Model) to test the short term relationship. Khan et al (2017) employed the event study methodology to gauge the impact of the annual budget and major political events in Pakistan on the KSE The results indicated the weak form of EMH in response to expected events it was observed that investors overreact to favourable news but underreact to unfavourable ones under unexpected events which are consistent with UIH. Osuala *et al (*2018) employed the standard event study methodology to carry out a comparative study on the impact of results of presidential election in Nigeria in 2011 and 2015 on stock market performance. They observed that uncertain anticipations under a new administration do not allow stock prices to move in particular direction. However information emerging from elections does help in valuing securities in stock market. Furió & Pardo (2012) examined the impact of Spanish political events on Spanish Stock market. An increased volatility on the Election Day and thereafter follows a relatively low volatility 3 days prior to elections corresponding the results of UIH. Dadurkevicius & Jansonaite (2017) attempted to understand the before and after effect of prescheduled political events on stock market in short term. It was observed that implied volatility induced by uncertainty associated prescheduled event increases before the event. This increases portfolio risk. Once results are out, abnormal returns vary depending on nature of industry.

The researcher observed no significant study conducted on response of stock market around political events in India especially around announcement of countrywide election results.

3. Objectives of the Study

> 1). To determine the effect of political events on the performance of Indian Capital Market
>
> 2). To test whether Indian stock market is efficient in semi strong form

4. Hypothesis of the Study

The hypotheses of the study framed based on the above objectives are:

H1: No Abnormal returns can be earned by trading stocks after announcement of election results H2: The AAR and CAAR throughout the event window are close to zero.

H3: The average abnormal returns show randomness in occurrence

H4: There is no significant difference between the volume of trade before and after event announcement

5. Research Methodology

The study is undertaken to understand the nature of the Indian Capital Market with respect to political announcement. We have considered the highly anticipated 2019 Lok Sabha Elections results announcement date as the event day for the purpose. The data used in the study comprises of the population set of all the 30 companies listed BSE SENSEX updated as on 24 December 2018 (with Tata Motors having 2 stocks in the list from where we considered only one). It uses data revolving around the date of election result announcements of 2019. . In order to understand the impact of this announcement on stock price movement, daily closing price data of these have been employed for an estimation window of 120 trading days. An event window of 21 days is used to check if the political announcement causes any stir any abnormal performance in the capital market.

Data on share prices are collected from the official websites of BSE.

5.1 Proxy for Market Portfolio

BSE 100 has been taken as the base index because of its wide acceptance in research works relating to stocks. It consists of the 100 most actively traded equity shares and has been compiled in the same method which Standard and Poor, USA follows in construction of its price indices. This index was earlier known as the BSE National Index

5.2 Tools and Techniques

The method to be employed to study the effect of election results announcement on share prices is the standard event study methodology. The event day is the date of "Announcement of Results of Lok Sabha elections 2019, India" on which certain anticipations and hopes waits. Share price considered as a dependence variable and the market returns is the independent variable. The study uses an event of 21 days distributed symmetrically around the event date to study the effect on equity share prices of BSE SENSEX. The window period has been designated as -10, -9, -8,… -3, -2, -1 as the 10 days prior to the event date, 0 as the event day and +1, +2, +3,… 8, 9, 10 as the days immediately succeeding the event. Only the active trading days in market are included. Further the Cumulative Average Abnormal Returns (CAAR) are also observed for (-3, +3), (-5, +5), (+7,-7) and (-10, +10) days during the announcement to gauge and distinguish between immediate and later impact

The market model shall be employed to for estimating the expected returns of the sample companies. The parameters of the model are estimated over the estimation window of 120 days before the event date. The proxy for market portfolio is the BSE100 selected based on its popularity in research works.

Further the Augmented Dickey Fuller (ADF) Test (also called the unit root test) is applied to measure the stationary of the variables and the presence of ARCH/GARCH effect is tested to understand the volatility during the study period.

5.3 Estimation Parameters

The daily returns for each of the 31 company have been computed for the event window period and for the estimation window period as under

$$R_{it} = (P_t - P_{t-1})/P_{t-1}$$

Where

R_{it} = Return of Company i at day t

P_n = Daily price of company at day t

P_{t-1} = Daily price of company at day t-1

Market returns are computed as follows:

$$R_{mt} = (I_t - I_{t-1})/I_{t-1}$$

Where

R_{mt} = Market Return at day t

I_n = Daily Index Value of Proxy Market at day t

I_{t-1} = Daily Index Value of Proxy Market at day t-1

The abnormal return for each of the companies during the event window is computed by subtracting the expected return from the actual return (abnormal return being excess of actual return over expected return). The parameters for the expected return have been estimated using ordinary least square (OLS) method of market model giver in the following equation:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_i$$

α_i = estimate of the intercept of Company i

β_i = estimate of the Beta of Company i

ϵ_I =independently and identically distributed residual error term

5.4 Abnormal Returns

The abnormal returns of company I on day t have been calculated as

$$AR_{it} = R_{it} - (\alpha_i +- \beta_i R_{mt})$$

To find out the combined effect, we estimate the Average Abnormal Return throughout the event window using the following formula

$$AAR_t = \sum AR_{it}/N$$

Next we obtain the Cumulative Average Abnormal Returns (CAARs) of various periods throughout the event window to examine the persisting effect of the event. T statistic has been used to test the significance of both AARs and CAARs. However if the sample size were more than 30, z statistic would have been used for testing the significance of both AARs and CAARs.

5.5 'T' Test for Abnormal Return

After the Average Abnormal Return (AAR) and Cumulative Average Abnormal Returns (CAAR) were calculated for the event window for all the 30 companies, student 't' test has been applied (two-tailed) to estimate the significance of the abnormal return. An estimator of standard deviation can be constructed from the abnormal returns and cumulative abnormal returns each company to find the significance of AAR and CAAR by using the following formula:

$$SD\ (AAR_t) = \sqrt{\frac{(AR_t - AAR)^2}{N}}$$

$$t\ (AAR_t) = \sqrt{N}\ \frac{AAR_t}{SD(AAR_t)}$$

$$SD\ (CAAR_t) = \sqrt{\frac{(CAR_t - CAAR)^2}{N}}$$

$$t\ (CAAR_t) = \sqrt{N}\ \frac{CAAR_t}{SD(CAAR_t)}$$

5.6 Runs Test for Randomness

To test the randomness of AAR, during the event window, run test is used. Run test has been conducted to test randomess in AAR before the event day, after the event day and also for the overall event window.

The Run test is calculated by using the following formula

$$\mu = \frac{2n_1n_2}{n_1+n_2} + 1$$

Where, n_1 = Number of positive AARs,

n_2 = Number of negative AARs,

μ = Number of Runs

The standard error of the expected number of Runs can be calculated by using following formula:

$$\sigma = \sqrt{\frac{2n_1n_2(2n_1n_2 - n_1 - n_2)}{(n_1+n_2)(n_1+n_2-1)}}$$

A standardized variable 'Z' calculated as under can express the difference between actual numbers of runs and expected number of the Runs

5.7 Paired t Test for Volume of Trading

The two tailed paired t test was used to test the difference in volume of trading before and after the event.

SPSS 20.0, MS Excel 2007 and E Views 10 student Lite were used to carry out the tests and calculations.

6. Analysis and Discussions

Table 1. Result of unit root test

		t-Statistic	Prob.*
Augm ented Dickey-Fuller	test statistic	-3.114488	0.0339
Test critical values	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

Null Hypothesis: AAR has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic-based on SIC, maxlag=9)

* Mackinnon (1996) one-sided p-values.

Source: Output from E views

After assuming the normality of AAR, The ADF (Augmented Dickey Fuller Test) was used to test the stationarity in abnormal returns. The p value of the test being 0.03(less than 0.05) allowed us to reject the null hypothesis that AAR has unit root. Thus the time series data of Average Abnormal Returns was found to be stationary at level.

Date: 10/13/19 Time: 20:17
Sample: 1 21
Included observations: 21

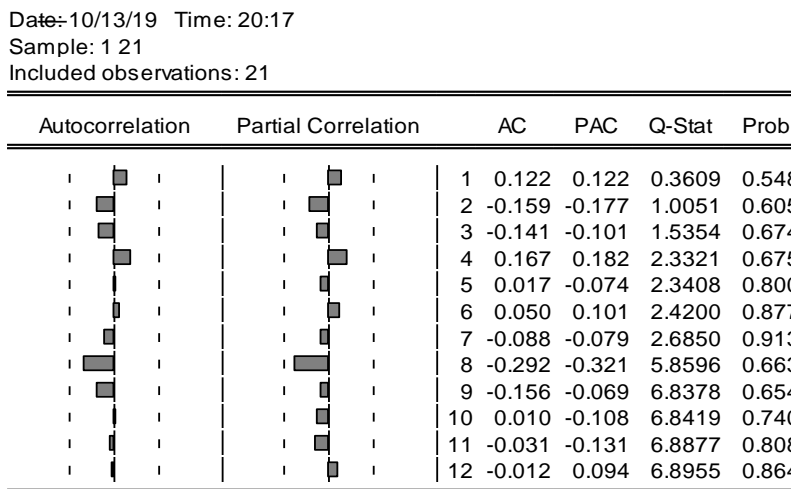| Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.122	0.122	0.3609	0.548
		2	-0.159	-0.177	1.0051	0.605
		3	-0.141	-0.101	1.5354	0.674
		4	0.167	0.182	2.3321	0.675
		5	0.017	-0.074	2.3408	0.800
		6	0.050	0.101	2.4200	0.877
		7	-0.088	-0.079	2.6850	0.913
		8	-0.292	-0.321	5.8596	0.663
		9	-0.156	-0.069	6.8378	0.654
		10	0.010	-0.108	6.8419	0.740
		11	-0.031	-0.131	6.8877	0.808
		12	-0.012	0.094	6.8955	0.864

Figure 1. Result of autocorrelation test

Source: Output from E views

Further, Moreover, we observed that the autocorrelation function of the linear model AARs and found no significant autocorrelation. So we proceeded to the analysis of ACF and PACF of the squared AARs and observed autocorrelation of the squared AARs at lag 1 to test whether the ARCH effect is present. The insignificant p values of autocorrelations did not allow us to reject the null hypothesis that there is no ARCH effect in abnormal returns. Hence we conclude that no high volatility was induced into the market returns by the announcement of Lok Sabha election results. This is further reflected by the following chart
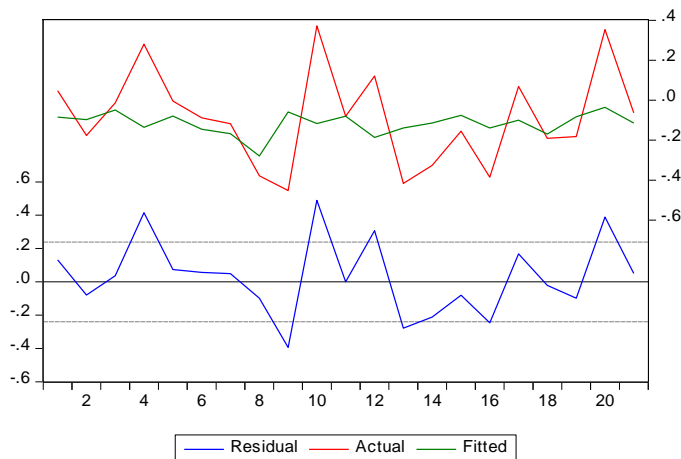
Figure 2. ARCH effect

From Chart, it can be observed that AAR was positive and highest on the day of the event fooled by a comparative sharp rises and surrounded by majority by negative returns around it. The after event fluctuations in AAR are seen to be more prominent than before the announcement.

H1: No Abnormal returns can be earned by trading stocks after announcement of election results

Table 2. Table showing AAR and CAAR throughout event window

Event Window	AAR	T stats	CAAR	t stats
-10	0.047048	0.161934	0.047048	0.161934
-9	-0.17648	0.491797	-0.12944	-0.26743
-8	-0.01301	0.034471	-0.14245	-0.20026
-7	0.280391	0.753567	0.137946	0.18672
-6	-0.00469	0.011568	0.133257	0.138461
-5	-0.08792	0.307113	0.045339	0.04182
-4	-0.11722	0.375532	-0.07188	-0.05626
-3	-0.37786	0.953874	-0.49508	-0.38528
-2	-0.45201	1.812888*	-0.90175	-0.66158
-1	0.372336	1.601408	-0.52941	-0.37357
0	-0.07988	0.206966	-0.60929	-0.42614
1	0.121396	0.450982	-0.4879	-0.32491
2	-0.41656	1.307915	-0.90445	-0.6302
3	-0.32595	1.535049	-1.2304	-0.9207
4	-0.15544	0.656169	-1.38584	-1.07395
5	-0.38494	1.493859	-1.77078	-1.29264
6	0.068938	0.255540	-1.70185	-1.15111
7	-0.1906	0.911015	-1.89245	-1.2574
8	-0.18183	0.865437	-2.07428	-1.39758
9	0.353262	1.148397	-1.72102	-1.12116
10	-0.0634	0.293343	-1.78442	-1.0652

Source: Market Model

Table 2 presents the response of share prices to the most anticipated political event of 2019 i.e. the announcement of the results of the great Lok Sabha Election 2019 for an event window of 21 days distributed symmetrically around the day of announcement which is taken as the event date. We have used the standard market model for analysis of the effect of this great event on behavior of the Indian capital market. The market model shows that AAR is negative for seven days before the event and positive for only three days which include the day before the event. The vent day witnessed a negative AAR followed by a positive reaction the day after. Thereafter AAR was negative for 7 days after the event with only 3 days of positive abnormal returns. Moving to the CAAR was found positive for 4 days prior to the event and negative for remaining 6 days. The announcement day too witnessed a negative CAAR after which CAAR continued to be negative for the remaining 10 days.

The continuous negative value of CAAR starting from 4 days prior to the announcement of election results till the last date of the event window suggests that market had negative anticipations from the declaration of the election results and that materialized in the form of negative response to the bad news conveyed within the announcement of the event.

Ho2: The AAR and CAAR throughout the event window are close to zero

Table 2 also depicts the t values of the AARs and CAARs under the market model throughout the event window. It is observed that all AARs and CAARs fall within the acceptance region (calculated t values less than critical value 2.045 and -2.045 at 5% level of significance and degrees of freedom 29). Thus we accept the null hypothesis that both AAR and CAAR are close to zero during the event window giving no opportunities to investors.

Table 3. Table showing statistical significance of AAR

Event Window	Calculated t statistics	Degrees of Freedom	Critical Value	Null hypothsesis
AAR	-1.628	20	2.0860	Accepted

Source: Test results in SPSS

Further the t value for AAR is not significant at 5% level of significant (calculated t value -1.628 less than the critical value 2.0860). Hence we fail to reject the null hypothesis that AAR throughout the event window is very close to zero. Thus we conclude that market does not give enough opportunities to earn abnormal return by trading on daily basis throughout the event window.

Table 4. Table showing CAAR for various event windows

Event Window	10 days CAAR	t stats	7 days CAAR	t stats	5 days CAAR	t stats	3 days CAAR	t stats
-10	0.047048	0.161934						
-9	-0.12944	-0.26743						
-8	-0.14245	-0.20026						
-7	0.137946	0.18672	0.280391	0.37953				
-6	0.133257	0.138461	0.275702	0.28647				
-5	0.045339	0.04182	0.187784	0.173211	-0.08792	-0.08109		
-4	-0.07188	-0.05626	0.070568	0.05524	-0.20513	-0.16058		
-3	-0.49508	-0.38528	-0.307293	-0.239143	-0.58299	-0.4537	-0.37786	-0.29406
-2	-0.90175	-0.66158	-0.759303	-0.557076	-1.03501	-0.75935	-0.82987	-0.60885
-1	-0.52941	-0.37357	-0.386968	-0.273059	-0.66267	-0.4676	-0.45754	-0.32285
0	-0.60929	-0.42614	-0.466846	-0.326513	-0.74255	-0.51934	-0.53741	-0.37587
1	-0.4879	-0.32491	-0.345451	-0.23005	-0.62115	-0.41365	-0.41602	-0.27704
2	-0.90445	-0.6302	-0.762008	-0.530951	-1.03771	-0.72305	-0.83258	-0.58012
3	-1.2304	-0.9207	-1.087954	-0.814108	-1.36366	-1.02041	-1.15852	-0.86691

4	-1.38584	-1.07395	-1.243397	-0.96356	-1.5191	-1.17721
5	-1.77078	-1.29264	-1.62834	-1.188656	-1.90404	-1.38991
6	-1.70185	-1.15111	-1.559402	-1.054758		
7	-1.89245	-1.2574	-0.190604	-0.126643		
8	-2.07428	-1.39758				
9	-1.72102	-1.12116				
10	-1.78442	-1.0652				

Source: Market Model

The above table shows the Cumulative Average Abnormal Returns (CAAR) observed for (-3, +3), (-5, +5) and (-10, +10) days during the announcement along with their respective t statistics. The insignificant t values for CAAR in all the again sub event windows indicate acceptance to the null hypothesis that this anticipated political event announcement did not have much effect on market prices of the shares. Further though CAARs were negative for each category of event window indicating some negative response to the event announcement.

Table 5. Statistical significance of CAAR for various event windows

Event Window	Calculated t statistics	Degrees of Freedom	Critical Value	Null hypothsesis
21 days CAAR (-10 to 10)	-4.960	20	2.0860	Rejected
15 days CAAR (-7 to 7)	-3.235	14	2.1448	Rejected
11 days CAAR (-5 to 5)	-5.335	10	2.2281	Rejected
7 days CAAR (-6 to 6)	-6.022	6	2.4469	Rejected

Source: Market Model

For t-10 to t+10 days

t value for CAAR is significant at 5% level of significance (calculated t value -4.960 greater than the critical value 2.0860). Hence we reject the null hypothesis that CAAR throughout the event window are zero. Thus we conclude that market may give opportunities to earn abnormal return through a buy and hold strategy starting from beginning to end of the event window but since CAAR for this period is negative, buy and hold strategy will only accumulate some losses at end for this event though the loss may not be severe.

For t-7 to t+7 days

t value for CAAR is significant at 5% level of significance (calculated t value -3.235 greater than the critical value 2.1448). Hence we reject the null hypothesis that CAAR throughout the event window are zero. Thus we conclude that a buy and hold strategy may yield negative result starting from a week before to a week after the event as indicated by a negative CAAR though the negative yield is very much close to zero.

For t-5 to t+5

The t value for CAAR is significant at 5% level of significance (calculated t value -5.335 greater than the critical value 2.2281). Hence we reject the null hypothesis that CAAR throughout the event window are zero. Thus we conclude that a buy and hold strategy may yield negative result starting from 5 days before to 5 days after the event because again CAAR is negative for this sub event window.

For t-3 to t+3

The t value for CAAR is significant at 5% level of significance (calculated t value -6.022 greater than the critical value 2.4469). Hence we reject the null hypothesis that CAAR throughout the event window are zero. Thus we conclude that again some minor negative returns will be suffered from a buy and hold strategy in this period.

Ho3: The average abnormal returns show randomness in occurence

Table 6. Results of runs test

Table: Results of Run Test on AAR with standard Market Model		
	No. of Runs	Test Statistics
Before	5	.000
After	6	.245
Overall	12	1.071

Source: Test results from SPSS

The runs test was conducted to check the randomness of AAR. It was observed that runs statistics were not significant before the event day, after the event day as well as throughout the event window (the runs statistics being less than critical value of 1.96 and -1.96). Thus we fail to reject the null hypothesis that AAR shows randomness in occurrence. Hence it is concluded that Abnormal returns around the event occur randomly without any definite pattern throughout the event window.

Ho4: There is no Significant difference between the volume of trade before and after event announcement (t test)

Table 7. Average trading volume

Day	Average Volume	Day	Averrage Volume
-10	71,38,706	0	1,30,14,203
-9	87,87,109	1	73,53,350
-8	85,75,311	2	77,73,460
-7	87,21,430	3	1,11,09,874
-6	82,75,753	4	69,48,135
-5	74,05,541	5	88,54,263
-4	92,43,076	6	93,73,484
-3	96,78,935	7	62,79,462
-2	70,89,260	8	57,88,569
-1	67,59,830	9	82,06,208
		10	61,93,674

Source: Secondary data

Table 8. Results of paired differences from paired sample t test

Mean	Standard Deviation	Standard Error Mean	Degrees of Freedom	P value
379447.2	2078885.21947	657401.22876	9	0.578

Source: SPSS

The results of the paired sample t test indicate that p value is 0.578. Thus we are unable to reject the null hypothesis and conclude that there is no significant difference between the volume of trade before and after event announcement.

7. Findings and Conclusion

The research study is an investigation into the effects of the results of most awaited results of the 2019 Lok Sabha Elections in India. The empirical results indicated the following:

1. The data for the event window are stationary in nature. Further no ARCH (Autoregressive Conditional Heteroskedascity) effect was found in the Average Abnormal Returns which indicate that announcement of election results create no volatility in market prices around this event announcement.

2. Average abnormal returns occur randomly around the event announcement with no significant difference between the number of runs before and after the event.

3. Cumulative Average Abnormal Returns(CAAR) starting from four days prior to the event announcement to after the announcement of the event continues to be negative throughout the event window

4. AAR was positive and highest on the day of the event followed by a comparative sharp rise and surrounded by majority by negative returns around it.

5. The after event fluctuations in AAR are seen to be more prominent than before the announcement

6. Both AAR and CAAR are not significant throughout the event window

7. CAAR around observed for (-3, +3), (-5, +5) are all negative and for all the event windows (-3, +3), (-7, 7), (-5, +5) and (-10, +10) are very much close to zero.

8. Average trading activity was found to be highest on the date of event announcement but there is no significant difference in volume of trade before and after the event though mean trading activity after vent reduced by only 2.83%

It can be observed that Indian Stock market reacted negatively to the event which was to bring uncertain financial and economic policies with the new administration. However the impact was not significant which corresponds to UIH (Uncertain Information Hypothesis) which states that stock prices under reacts to bad news. The result is contradictory to results of the Impact of US presidential elections on US stock Market (Bouoiyour & Selmi, 2016). The insignificant negative reaction of the stock market to the declaration of Lok Sabha Elections 2019 could be attributed to a comparative high weight of unwelcomed information over the affirmatives that came with it. However the reaction being not significant also indicates that the vast majority win of NDA Government was not that uncertain. The study provides no ample evidence for significant immediate reaction of stock prices to the major political news announcement.. Thus, we conclude that the Indian stock market is semi-strong efficient in nature and no trading strategies can be adopted for abnormal returns in the short run.

8. Future Scope

A comparative study may be undertaken on impact of the General Elections in the country for a longer time period. The impact of multiple political events and changes on the capital market may be studied to have an advanced research on efficiency of the Indian Stock Market.

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