Article No.1

AN EMPIRICAL ANALYSIS OF BANKING SECTOR REACTION TO FINANCIAL NEWS ANNOUNCEMENT DURING PANDEMIC DRIVEN CRISES

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Abstract: *All new material information with regards to the company reflects in the movement of prices of the securities. However, the speed at which this movement in prices appears and the prices of the securities reach their intrinsic level depends upon the efficiency of the capital market. The market is said to be efficient to a piece of given information if no investor can make an abnormal profit. With the increased momentum of investments into markets during the pandemic, greater importance is being given to the understanding of the market efficiency which a market inhibits.*

This paper tests the semi-strong form of market efficiency by evaluating the announcement impact of finance and banking related public announcements made during the pandemic time on the NIFTY Bank Index. Total 8 events have been identified for analysis and the Nifty bank Index has taken as a proxy to examine the announcement impact on the banking sector. Using the standard event study methodology, the paper investigates the market reaction to monetary policy and stimulus package announcements for the period Jan 2020-Dec 2020. Abnormal return and Cumulative abnormal return calculated for pre 30 days and post 30 days were analyzed in the paper for being statistically significant using t-test. A paired sample t-test has been applied to test the significant difference in abnormal return between pre-event and post-event window. The results of the AARs and CAARs indicate that investors would be able to earn abnormal returns by analyzing the event and by selling the stocks traded in NIFTY Bank Index after the eventswere made public. Therefore, we can conclude that NIFTY Bank Index is not efficient in the semi-strong form.

Keywords: *NIFTY Bank Index, Semi-strong form of efficiency, Event Study Methodology.*

JEL Classification: G14, C12

Introduction

Market efficiency refers to the environment in which the favorable investment opportunities have access to the needed funds, for which the market has to be both internally and externally efficient. **Internal Efficiency** of the market is a situation where the cost of transactions is high. Government and statutory authorities frame rules and regulations to ensure the internal efficiency of the market. **External Efficiency** of the market refers to the speed with which the information about the companies/ securities is

disseminated and allows the securities prices to adjust in an unbiased manner to refer to the new investment value. The investment value of a security is 'fair' or 'intrinsic' value and can be defined as the present value of the investment's prospects. In an efficient market, the investments are traded at an equilibrium price equal to the investment value.

The efficient market hypothesis, alsoknown as **efficient market theory**, refers toahypothesis that states that the share prices reflect all information and consistent alpha (i.e. excess return or abnormal rate of return) is impossible to generate.In the capital market, securities prices are determined by the demand and supply forces which are based on the expectations of investors about the future. These expectations are based on the information about different variables/ news pertinent to that company/ security. An efficient market hypothesis is concerned with the assessment and use of thesepieces of information by the investors. A market is said to be an efficient one if the security prices reflect all available information by the investors and the security prices reflect their true economic value. In a less than efficient market, the security prices reflect an approximation to the true value. In the capital market, security prices may reflect the following:

- All past information regarding the security and the company.
- All information that is announced but yet to be implemented.
- All information that has been generated but not yet made public and is known to only the insiders.

Three forms of market efficiency have been stated:

- **Weak Form of Market Efficiency**
  The weak form of efficiency is also known as **Random Walk Theory** which states that the securities prices move as a result of inflows of news that randomly enter the market.
  The weak form of efficiency discards the *technical analysis* because if there is no value in studying the past prices and changes therein, then there is no utility of technical analysis. There is nothing to be gained from studying the past prices.

- **Semi-strong Form of Market Efficiency**
  In the semi-strong form of market efficiency, the current prices in the capital market not only reflect the historical information but are also able to rapidly adjust to all the publicly known information. Semi-strong form maintains that as soon as the information becomes publicly available, it is absorbed in the prices. So, the security prices reflect all the publicly available information. **As all public information is already reflected in the value of the security, no one can use the fundamental analysis to determine whether a stock is overvalued or undervalued.** The semi-strong form supports the view that there is no learning lag among investors. Whenever new information is generated, all the participants in the market assess the information with equal speed and efficiency. No investor

would be able to out-perform the market which quickly incorporates all the available information.

- **Strong Form of Market Efficiency**
  In a strong form of market efficiency, the securities prices reflect all information, whether published or unpublished, and even private inside information.

In the period of economic crises capital market sentiments also goes into radical changes. Economic disruptions caused by Covid driven pandemic has taken the capital market aback during the period of nationwide lockdown. To maintain the growth momentum a great deal depends upon the fiscal stimulus package by the government and monetary measures by the central bank. With progressively easing the lockdown Government of India took support fiscal measures that can be broadly categorized as Government spendings (about 3.2% of GDP: imf.org) and business support measures and credit provisions (about 5.2% of GDP: inf.org). Similarly, RBI announced during the period the measures to enhance liquidity and cumulative liquidity injections in the economy. These announcements have a bearing on the price movement in the capital market, very particularly onthebanking sector index. This study examines the announcement impact of the stimulus/ relief packages and credit policy measures on the share price of banking sector players thereby study the form of market efficiency exhibited by the Indian capital market.

Literature Review

Thathaiah, (2014) This paper tested the semi-strong form of market efficiency, using quarterly earnings announcements, of 160 companies as a piece of publicly available information. They used June 2008 quarterly results of the BSE-200 index. To study the information they computed the expected return (AR), the average abnormal return (AAR), and the cumulative average abnormal returns (CAAR) on the event day, over the 30 days before and after the event date. They further tested the AARs for statistical significance by using the t-test, Run test, and Sign Test. Their study results indicated that investors would be able to earn abnormal returns by analyzing the quarterly earnings of June 2008 and by selling the stocks after the results are announced. Further, their results show that there is a continuous decline in the values after June 2008 quarterly results indicating that results have negative signals to the market. They found that the investors incur abnormal losses by buying the stocks and earn abnormal profits by going short on these stocks. Thus, they drew the inferences that the Indian market is slow in reacting to the publicly available information, which is a sign of market inefficiency. They concluded that the Indian capital market is not efficient in the semi-strong form.

Hawaldar & Thathaiah, (2010) This study tested the reaction of the Indian stock market to December 2000 quarterly earning announcements**.** The study selected 140 companies listed on the Bombay stock exchange. Using the event study methodology the behavior of average abnormal returns (AARs) and the cumulative average abnormal returns (CAARs) were examined for 30 days before and 31 days after the announcement of quarterly

earnings. The study found that Run test, sign test, and t-test statistics on AARs are statistically not significant. However, t-values on CAARs are statistically significant. The authors concluded that the Indian stock market is not efficient in the semi-strong form.
Belgaumi, (1995) This study analyzed 70 companies listed in the 'A' list category of the Bombay stock exchange. This paper studied the weak-form efficiency of the Indian stock market. The study subjected the weekly share prices to the Serial Correlation Analysis and Run Test. The author found that the Indian stock exchanges are efficient in the weak form and that the independence assumption regarding the movements of the share prices over the short period holds good**.**

Nympha, Joseph, Kumar, Kulal, & Kumar, (2017) This paper studied the earnings information and earnings efficiency in Bahrain by considering the annual earnings announcement as an event. The 32 companies under study were listed on Bahrain Bourse. The study used the event study methodology and t-test to examine the behavior of AARs and CAARs for 30 days before and after the announcement of annual earnings. The results of the study contradict the semi-strong form of an efficient market hypothesis.

Watts, (1978) This paper studied whether abnormal returns were observed when the steps are taken to reduce the effect of deficiencies in the capital asset-pricing model. The study found a significant abnormal return without covering the transaction cost. This study further whether the abnormal returns can be attributed to a capital asset-pricing model. The results gave the evidence that that cannot.

Vipul, (1997) This paper has used the event study methodology in two factor Capital Asset Pricing Model framework to analyze the residuals for the ex-dividend period and six months before it and three months following it. The results of the analysis of residuals revealed the presence of abnormal positive and negative returns for the ex-dividend month, a month before it, and four months before it. Information effect of dividend announcements is present in the Indian market and so is the dividend yields higher than 5%. However, for dividend yield below 5%, the dividend is completely ignored by the market converting almost the complete yield into an abnormal return of the ex-dividend period.

Lukose & Rao, (2002) This paper investigates the effects of stock splits on market valuation and trading patterns around the split announcements and ex-date. The authors observed a significant abnormal return of 7.14% around the stock split announcements, which was consistent with the signaling-based explanations. The authors further examined the relevance of other theoretical explanations such as the liquidity hypothesis and tax option model in the Indian context. The study found no evidence for increased liquidity after stock splits. But the results show a change in the investor's profile of the firms. The data gave no evidence for an upward shift of variance but statistically significant abnormal returns are observed on the ex-split date.

M.Ananthi & S.Dinesh, (2012) The major objective of the study was to assess the pricing behavior of the events in LIC Housing Finance Limited, to evaluate the risk of the stocks in a particular index, and to identify the effect of those events in the whole market.

This study aimed to test the efficiency of the Indian stock market concerning the corporate announcement by LIC housing finance limited. The study was carried out as an event study under the semi-strong form of market efficiency using the rate of return, beta, excess return, and average excess return, pivot point, and t-statistics as a tool to test market efficiency. The conclusion of the study indicated the effects of corporate event announcements regarding the capital market.

Khan & Ikram, (2010) This paper tested the efficiency of the Indian capital market with regards to the impact of Foreign Institutional Investors (FII's). For testing, two major stock indices, namely the National stock exchange, and Bombay stock exchange, have been taken. For the study, Karl-Pearsons' Product, Moment Correlation Coefficient, and linear regression equations were used to analyze and determine the degree and direction of the relationship between the two variables involved. The results of the study suggested that FII's do not have a significantimpact on the Indian capital market. Thus, the authors concluded that the Indian capital market is semi-strong form efficient.

Objectives Of The Study

- To test whether the Indian stock marketexhibita semi-strong form of Market Efficiency.
- To test the NIFTY Bank Index reaction to publicly available information/ announcements that had direct implications on the banks and their share price movement in the capital market.

Data & Methodology

DATA This paper is structured to study the impact of the publicly available information/ media announcements on NIFTY Bank Index price movement. We have used three sets of data in our study. The first set of data consists of media announcement dates of:

- Stimulus packages from the government and institutions in response to the COVID-19 crisis.

Dates	Event
26th March 2020	**INR 1.7 trillion relief package announced by the Finance Minister of India**
15th May 2020	**INR 20 trillion of COVID relief package was announced by the Prime Minister of India**
14th Nov. 2020	**INR 2.65 lakh crore comprehensive stimulus package announced by the Finance Minister of India**

Source: https://home.kpmg

- The merger of public sector banks.

Dates	Event
4th Mar. 2020	**The Finance Minister of India said that the exercise of**

	consolidation of 10 public sector banks (PSBs) into 4 is on course and the merger will come into effect from 1st April 2020.

Source: https://timesofindia.indiatimes.com/business.

- Monetary policy statements of RBI during the pandemic

Dates	Event
27th Mar. 2020	**Moratorium on Term Loan Instalments; Statement on Developmental and Regulatory Policies**
10th Jun. 2020	**Monetary Policy Statement, 2020-21 Resolution of the Monetary Policy Committee (MPC), Reserve Bank of India**
13th Aug. 2020	**Monetary Policy Statement, 2020-21 Resolution of the Monetary Policy Committee (MPC), August 4 to 6**
24th Oct. 2020	**Monetary Policy Statement, 2020-21 Resolution of the Monetary Policy Committee (MPC), October 2020**

Source: www.rbi.org.in

The second set of data consists of daily adjusted closing prices of the NIFTY Bank Index. Finally, the daily closing prices of the NIFTY-50 Index is used to find out the market return. The data is collected from the National Stock Exchange (NSE) India website.

Methodology

The paper used event study methodology to examinethe information flow duringannouncements dates of 8 events during the pandemic. The dates on which announcements weremade public are defined as the event dates (AD):t = 0. The61 days surrounding the announcement of earnings(i.e., t = - 30,…,0,…, +30) is designated as the"event" period or "event" window. The days beforethe event period (i.e., -330,…, -31) is used as the estimation window period. The market model of Sharpe (1964) isused to estimate expected returns of the events understudy for the event window. Mathematically, the market model canbeexpressed as

$E(R_{it}) = \alpha_i + \beta_i R_{mt} + e_{it} for i = 1,....N$

Where, $E(R_{it})$ = Expected return on NIFTY Bank Index 'i'during time period't',

α_i = i^{th}eventIntercept of a straight –line or the alpha coefficientof the dependent variable Nifty bank on the market index during estimation window,

β_i = i^{th}eventSlope of a straight –line or the beta coefficient of the dependent variable Nifty bank on the market index during estimation window,

R_{mt}= actual return of the market (Nifty 50 index in this study) during the period't'.

e_{it}= error term

The estimated returns for the event window is then compared with the actual return on the day to calculate the abnormal return (AR)

$AR_{it} = R_{it} - E(R_{it})$

Where R_{it} = Actual return on NIFTY Bank Index for an event 'i' during time period 't'

The estimatedabnormal returns are then averaged across each event to calculate the average abnormal return (AARs). The following model is used to calculate Average Abnormal returns (AAR)

$AAR_t = \sum AR_{it}/N$, Wherei = Different events in the study, t = The days surrounding the event day

The computed average abnormal return is then cumulatedover time to ascertain the cumulative averageabnormal return (CAAR).The event window used in studies is a sixty-one-day event window starting at *t1*=−30 and ending at *t2*=30. Subsequently, CAAR of other time frames within the event window is also analyzed using the following formula-

$$CAAR(t1, t2) = \sum_{t=t1}^{t2} AARt$$

Hypothesis

- The investors cannot earn abnormal returns by trading in the stocks after a piece of information/ announcements are made public. H_{01}: $AAR_t = 0$
- Indian stock market doesnot exhibit the semi-strong form of market efficiency. H_{02}: $AAR_t = 0$ and $CAAR_t = 0$
- There is no significant difference between the pre and post announcement days average abnormal returns. H_{03}: Mean difference between pre and post AD = 0

Tools For Analysis

Serra A. P.(May 2002) suggested the hypothesis testing using a t-test to determine whether abnormal return realized during event window is significant or happened by chance. For a sample of 8 events, the cross-sectional mean abnormal return for any period *t* is to establish whether the cross-sectional distribution of returns at the time of an event is abnormal. To analyzeH_{01}:*AAR*=0 the test is given by

$$AARt = \frac{AARt}{SDAARt/\sqrt{n}}$$

Where; $SDAAR_t$= standard deviation of average abnormal returns of securities for a specified time t.

The test statistic for testing *H*0: *CAAR*=0 is given by

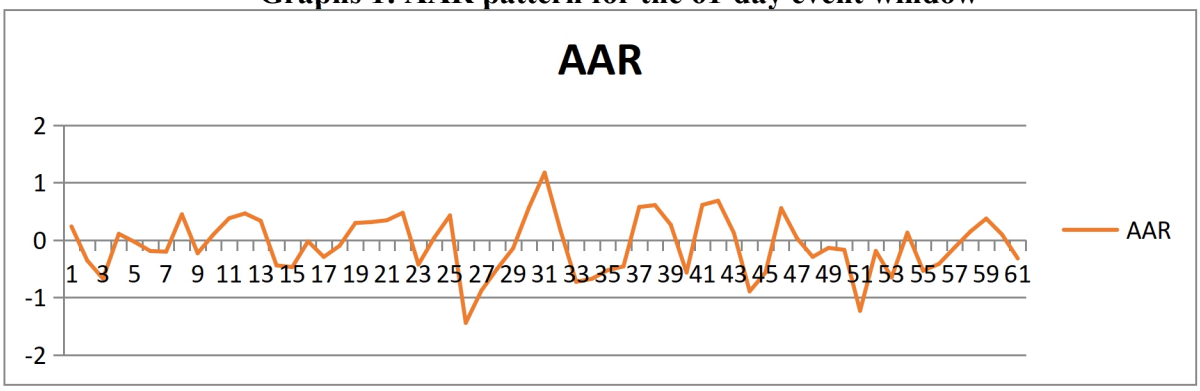
$$t\ CAAR = \frac{CAAR}{\sqrt{(t2 - t1) * SDAARt}}$$

Findings And Result

We have examined the semi-strong form of EMH by using above mentioned methodology and the empirical results are shown below:

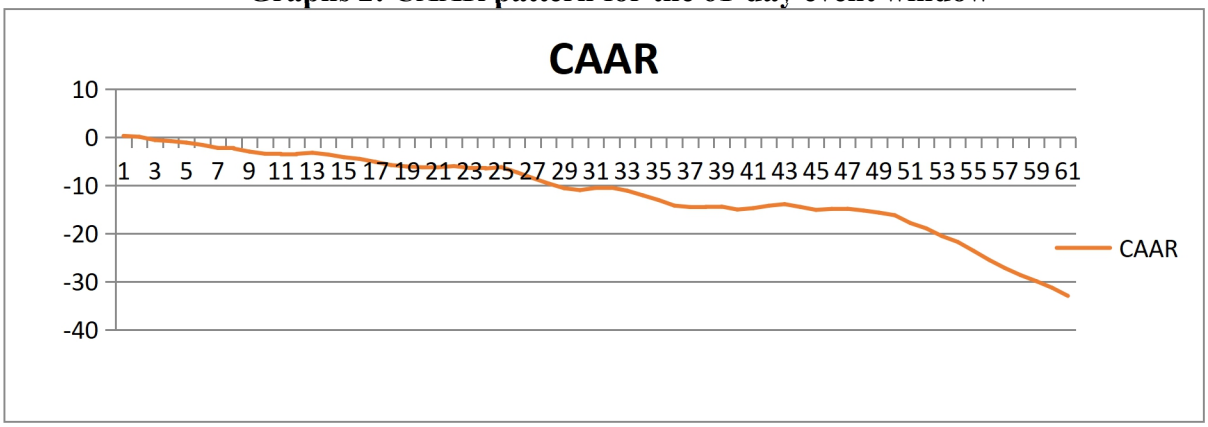
7.1: Pattern of AAR and CAAR during the event window

Graphs 1: AAR pattern for the 61-day event window



Source: Authors Compilation

Graphs 2: CAAR pattern for the 61-day event window



Source: Authors compilation

In Graph 2, a downward falling CAAR chart is observed before the AD prominently from day -28 to AD. The abnormal return has cumulated to -10.99% before the AD. Further, when we observe the entire window of CAAR, it is positive for 2 days (3.28%) and negative for 59 days (96.72%).This is fairly evident that the negative information/ announcement (events) was much expected in the market.

Market reaction on announcement and form of market efficiency

Table 1 presents the results of the NIFTY Bank Index price response to the publicly available information/ announcements for the event window (61-day event window). It is observed that AAR is negative for 16 days and positive for 14 days before the event day. The AAR is negative for 17 days and positive for 13 days after the event day. Whereas,

the CAAR values are negative for 28 days and positive for 2 days before the event day. It is also observed that the CAAR is negative for all the days after the event day. When we observe the entire event window, AAR values are negative for 33 days (54.1%) and positive for 28 days (45.90%) and CAAR values are positive for 2 days (3.28%) and negative for 59 days (96.72%).
Further, table 1 shows that the CAAR values are consecutively negative from the 28th day before the event window. Thissuggests that market that the market expected negative financial news/ announcement during the pandemic-driven crisis and bad news was conveyed to the market and the negative response continued even 30 days after the financial news/ announcement (i.e.an event) was made public.

Table 1 shows that the 't' value of AAR. Under the market model, out of 61 't' values, none of the 't' values fall in the rejection region or are statistically significant (i.e. the calculated 't' value is greater than the critical value of ± 1.96), but all 61 't' values fall within the acceptance region or are statistically insignificant (i.e. the calculated 't' value is less than the critical value ± 1.96). From this, we infer that AAR is approximately zero for almost all 61 days and therefore no trader could earn a profit if he trades daily for all days during the event window.

CAAR is statistically significant for all events days from T-2 day. So we reject the null hypothesis that the CAAR values are close to zero. From this,it is inferred that the market allows earning abnormal profit by using the buy-and-hold strategy.

Table 1: Cross-sectional analysis for the event window

Days	AAR	t stats	p-value	CAAR	t stats	p-value
-30	0.235912	0.060251	0.95364	0.275016	0.056898	0.954819
-29	-0.35547	-0.24558	0.813055	0.082894	0.01715	0.986375
-28	-0.67122	-0.2998	0.773036	-0.59249	-0.12258	0.902856
-27	0.107469	0.058681	0.954847	-0.80838	-0.16724	0.867749
-26	-0.03253	-0.00775	0.994029	-1.12734	-0.23324	0.816385
-25	-0.19108	-0.20799	0.841159	-1.6002	-0.33106	0.741769
-24	-0.20229	-0.08423	0.935228	-2.24036	-0.46351	0.644706
-23	0.446838	0.147963	0.886544	-2.36531	-0.48936	0.626402
-22	-0.22905	-0.10143	0.922052	-2.99004	-0.61861	0.538554
-21	0.096336	0.038203	0.970593	-3.44687	-0.71312	0.47858
-20	0.379391	0.161832	0.87601	-3.55614	-0.73573	0.46481
-19	0.462395	0.130252	0.900031	-3.4559	-0.71499	0.477434
-18	0.333958	0.181177	0.861363	-3.23333	-0.66894	0.50614
-17	-0.44077	-0.21408	0.836588	-3.60294	-0.74541	0.458981
-16	-0.47033	-0.21769	0.833881	-4.15698	-0.86004	0.393249
-15	-0.02208	-0.00965	0.992573	-4.50772	-0.9326	0.354826
-14	-0.29296	-0.10424	0.919904	-5.12967	-1.06128	0.292889
-13	-0.09957	-0.02579	0.980141	-5.79098	-1.1981	0.23567

-12	0.296447	0.124551	0.90438	-6.0836	-1.25864	0.213119
-11	0.312215	0.227489	0.826545	-6.25836	-1.29479	0.200436
-10	0.343913	0.075349	0.942045	-6.24544	-1.29212	0.201354
-9	0.473343	0.151332	0.883983	-6.00031	-1.2414	0.219369
-8	-0.42543	-0.15898	0.878174	-6.39401	-1.32286	0.190987
-7	0.039578	0.017909	0.986211	-6.50359	-1.34553	0.183603
-6	0.427276	0.233277	0.822221	-6.22017	-1.28689	0.203158
-5	-1.43987	-0.18218	0.860603	-7.30477	-1.51128	0.136054
-4	-0.87531	-0.1288	0.901141	-8.49361	-1.75724	0.084064
-3	-0.4965	-0.16405	0.874328	-9.61283	-1.9888	0.051367
-2	-0.14467	-0.04478	0.965534	-10.6013	-2.19331	0.032238*
-1	0.560121	0.214389	0.836355	-10.9934	-2.27442	0.026592*
0	1.171609	0.13374	0.897372	-10.5357	-2.17973	0.033281*
1	0.171747	0.025444	0.980411	-10.4844	-2.16913	0.034114*
2	-0.72678	-0.17132	0.868822	-11.114	-2.29938	0.02504*
3	-0.67381	-0.13347	0.89758	-12.0809	-2.49943	0.015241*
4	-0.52494	-0.11763	0.909662	-13.0611	-2.70221	0.00898**
5	-0.4579	-0.10977	0.915672	-14.2153	-2.941	0.004667**
6	0.574503	0.188323	0.855967	-14.5129	-3.00257	0.003922**
7	0.606911	0.13695	0.894926	-14.462	-2.99205	0.004041**
8	0.265269	0.072663	0.944107	-14.4164	-2.98262	0.00415**
9	-0.56457	-0.32134	0.757332	-15.0291	-3.10937	0.002885**
10	0.61017	0.205807	0.842799	-14.7457	-3.05073	0.003418**
11	0.683322	0.083168	0.936046	-14.2348	-2.94503	0.004615**
12	0.123635	0.036058	0.972243	-13.9092	-2.87769	0.00557**
13	-0.89179	-0.22981	0.824807	-14.4853	-2.99686	0.003986**
14	-0.56589	-0.18337	0.859708	-15.0999	-3.12401	0.002765**
15	0.553349	0.113198	0.913051	-14.8969	-3.08202	0.003123**
16	0.03227	0.009279	0.992856	-14.8706	-3.07657	0.003173**
17	-0.29219	-0.09469	0.927211	-15.2234	-3.14958	0.002566**
18	-0.13646	-0.03172	0.975582	-15.6707	-3.24212	0.001954**
19	-0.17053	-0.06196	0.952323	-16.2089	-3.35345	0.001399**
20	-1.2305	-0.39723	0.703028	-17.844	-3.69174	0.000488**
21	-0.18988	-0.04929	0.962064	-18.9397	-3.91844	0.000234**
22	-0.64922	-0.32474	0.75487	-20.5445	-4.25046	7.7E-05**
23	0.127365	0.038589	0.970296	-21.7527	-4.50042	3.24E-05**
24	-0.53366	-0.09943	0.923587	-23.5938	-4.88132	8.38E-06**
25	-0.41525	-0.17126	0.868863	-25.4979	-5.27526	1.98E-06**
26	-0.12861	-0.02686	0.979319	-27.1886	-5.62504	5.37E-07**
27	0.148482	0.033473	0.974232	-28.6597	-5.92942	1.69E-07**
28	0.372708	0.132677	0.898183	-29.9119	-6.18848	6.28E-08**

29	0.097273	0.036324	0.972038	-31.2806	-6.47165	2.11E-08**
30	-0.31987	-0.09764	0.924953	-32.965	-6.82014	5.45E-09**
*** significant at a 5% level of significance, ** significant at a % level of significance**						

Source: Authors Compilation

Difference in the pattern of return between pre and post announcement days

The resultofthe t-test is 2.659, when comparing the value to the 't' critical two-tail statistics, gives the probability that the absolute value of t statistics is larger than the critical 2.045. Since the p-value is less than alpha 0.05, we reject the null hypothesis and conclude that there is a significant difference in the abnormal return generated by NIFTY Bank Index pre and post announcement dates. The difference verifies the proposition that the event contains signals and information contained in publicly available information impounded around event announcement during the pandemic driven crisis.

Table 2: t-Test: Paired two sample for Mean

	PRE AD (-30,-1)	**POST AD (+1,+30)**
Mean	-0.366445155	-0.747644363
Variance	0.165371321	0.529821103
Observations	30	30
Pearson Correlation	0.133345438	
Hypothesized Mean Difference	0	
df	29	
t Stat	2.659706201	
P(T<=t) one-tail	0.006302036	
t Critical one-tail	1.699126996	
P(T<=t) two-tail	0.012604072	
t Critical two-tail	2.045229611	

Source: Authors Compilation

Conclusion

This study was undertaken to analyze the banking sector reaction to financial news announcements during the pandemic driven crisis to test whether the securities traded in NIFTY Bank Index follows the semi-strong form of an efficient market hypothesis. The hypothesis was formulated and tested by using the 't' test. The average abnormal return and the cumulative average abnormal returns around the announcement dates were examined using the event study methodology. The 't' test statistics accept the null hypothesis that AAR values are close to zero. Excess of abnormal return is noticeable by observing the CAAR values. When we observe the 't' values, it is found that 90.16% (55 days) significant for the event window. It has been proved in this study that the null hypothesis is rejectedand concludes that CAAR is significant. The results of the AARs and CAARs indicate that investors would be able to earn an abnormal profit during crises

in the banking sector by analyzing the information/ announcements and by selling the stocks traded in NIFTY Banking Index after the information/ announcements were made public. The information adjustment continues until 30 days after the information/ announcements were made public. Further, the CAARs show that there is a continuous decline in the values after the financial news/ announcements were made public. This indicates that these results have given negative signals to the market. Since the investors incur abnormal losses by buying the stocks and earn abnormal profits by going short on the stocks traded in NIFTY Bank Index, we infer that the NIFTY Bank Index is slow in reacting to the publicly available financial information/ announcements. This is a sign of market inefficiency. Therefore, we can conclude that NIFTY Bank Index is not efficient in semi-strong form.

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