

An Event Study Analysis on Semi - Strong Form Efficiency of Selected Auto Index Stocks Listed in National Stock Exchange

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Abstract:- The purpose of this paper is to investigate the dynamic constituents that have an impact on the stock prices in assessing the capital market efficiency. The study focuses on selected auto index stocks to investigate the impact of specific events on stock prices and market efficiency by employing relevant statistical analyses. The methodology involves identifying key event such as Dividend announcement during the study period 2022-2023 of five auto index companies. Through the examination of abnormal returns and cumulative abnormal returns surrounding these events, the study aims to assess the speed and efficiency with which capital markets incorporate new information. The study aims to contribute valuable insights into the responsiveness of capital markets to significant events within the automotive industry by shedding light on the efficiency and incorporation of the information by events on stock to become reactants through stock prices.

Keywords:- Capital Market, Event Study, Semi-Strong Form Efficiency.

I. INTRODUCTION

Capital Markets are financial institutions where long-term financial business is associated in the financial needs of fulfilling the requirements of both investors and companies, it is a place where long term securities such as shares and bonds are traded. These markets play a significant role in facilitating the capital flows to the beneficiaries. The Efficient Markets Hypothesis (EMH), also known as the Random Walk Theory is the competence of the markets to adjust with the relevant market information that insights the opportunities for trader to put forward that current stock prices fully incorporate available information about a firm's value, making it impossible to gain abnormal profits from such information. The informational efficiency of stock prices matters in two standpoints of investors. First, investors concerned about whether various trading approaches can earn abnormal returns. Second, if stock prices accurately reflect all information. The concept of stock market efficiency evolved

with its significance by the various researcher, academicians as well in the business world. Understanding the efficiency of the market over the different events is crucial for investors, traders and the business is relevant to flare up over the uncertainties.

II. CONCEPTUAL BACKGROUND

A. Efficient Market Hypothesis (EMH)

The Efficient Market Hypothesis (EMH) is a fundamental concept in financial economics that provides a framework for understanding how information is reflected in asset prices within financial markets. Proposed by Eugene Fama in the 1960s, the EMH asserts that financial markets are efficient and that asset prices fully and accurately incorporate all available information.

B. Three Forms of Efficiency

Weak Form of Efficiency assumes that past price and volume information is already reflected in current prices.

Semi Strong Form of Efficiency assumes that all publicly available information, including not only historical data but also all public news and announcements, is already reflected in asset prices.

Strong Form of Efficiency assumes that all information, including public and private information, is fully reflected in asset prices.

III. EVENT STUDY METHODOLOGY

Event study methodology is a research approach used in finance and economics to assess the impact of a specific event on financial markets or asset prices. This method is particularly common in analyzing the effects of corporate events, policy changes, or economic announcements on stock prices.

Event study methodology involves defining the event, selecting an event window, event estimation and identifying sample assets. Choose a metric and estimate normal returns using statistical models, and calculate abnormal returns.

Conduct statistical tests to assess the significance of abnormal returns and conduct sensitivity analyses for robustness. Interpret results to understand the event's impact on asset prices. Table-I shows techniques used in the study.

Table 1:- To Assess the Sensitivity of Certain Events Over Stock Prices

1	Stock Return	$R_{jt} = P_{jt} - (P_{jt} - 1) / P_{jt} - 1$
2	Market Return:	A. $R_{mt} = I_t - (I_t - 1) / I_t - 1$
3	Expected Return	$E(R_{jt}) = \alpha_j + \beta_j R_{mt}$
4	Abnormal Return	$AR_{jt} = R_{jt} - E(R_{jt})$
5	Average Abnormal Return	$AAR_t = \frac{1}{n} \sum AR_{jt}$
6	T test for Average Abnormal Return (t – AR)	$T = AR_t / \sigma AR_t$
7	T test for Average Abnormal Return (t – AAR)	$T = AAR_t / \sigma AAR_t$
8	T test for Cumulative Average Abnormal Return (t – AAR)	$T = CAAR_t / \sigma CAAR_t$

IV. LITERATURE REVIEW

Subeesh V.K., M.A. Joseph (2023), examined five popular Indian stocks from April 1, 2016, to March 31, 2017, employing event analysis and t-tests to assess the semi-strong form efficiency of the market. Results reveal the Indian Stock Market's semi-strong inefficiency, indicating biased random time series behaviour. Contrary to the random walk model, undervalued securities persist, allowing investors to gain excess returns through astute selections, challenging the assumptions of the Efficient Market Hypothesis and Capital Asset Pricing Models.

Prema Krishnan A, M. N. Periasamy B, (2022), evaluated the semi strong form of efficiency by conducting event study methodology on selected IT index stocks listed in NSE during dividend announcement periods. Out of the ten companies within the Nifty IT Index, five were specifically chosen based on their dividend announcements from 2016 to 2020. Statistical analyses, including T tests and P values, were conducted to gauge the impact of dividend announcements on the selected sample from the Nifty IT Index. The study's findings, derived from Average Abnormal Returns, suggest market efficiency during dividend announcements, indicating that investors cannot attain abnormal returns. In essence, the study implies that stock prices promptly incorporate available information.

Patel, P., Savani, J., & Poriya, N. (2017), Investigated the behaviour aids rational investors in earning abnormal returns using event study and cross-sectional data analysis, investigates semi-strong market efficiency in Indian stock markets concerning 'dividend and bonus announcement' events. Findings reveal significant share price impact only one day before the announcements.

John Okey Onoh, Nkama Nkama O. (2016), assess the impact of dividends on share prices in the Nigerian stock market. Analysing reactions within 3-day, 21-day, and 61-day windows around dividend announcements, the research investigates the speed of share price adjustment. Results indicate positive and statistically significant Cumulative Abnormal Returns (CERs) for the 3-day, 21-day, and 61-day event windows, revealing inefficiencies in the market's reaction to dividend announcements.

Ravi Shankar Kummata and Dr. B.R. Megharaj (2015), The study focuses on employing a Paired-T-test to analyse the impact of bonus shares announcements. Results reveal statistically insignificant post-event stock returns, indicating no significant difference from pre-event returns, the study suggests that bonus shares announcements had no overall impact on selected security performance.

M. Bharath, H. Shankar (2015), examined the impact of bonus announcements on stock prices act for semi strong form efficiency of the Indian stock market for the period from 2003 to 2012. Applying event study methodology, a 41-day event window was established to observe the price reactions. The analysis differentiated bonus issues into small and large sizes, aiming to determine the potential for abnormal returns during the price adjustment period. The findings revealed that announcements of large size bonuses exhibited more favorable price adjustments compared to small size bonuses, suggesting evidence of semi-strong form market efficiency.

V. RESEARCH PROBLEM

The exploration of capital market efficiency helps to get insight into the extent, speed, and accuracy with which available information influences security prices. Various studies have performed an assessment to check the market efficiency by considering the overall market by random selection of stocks belongs to different sectors. This study aims to provide valuable insights to shape informed investment strategies for investors by assessing the sectoral index efficiency by testing semi-strong efficiency.

VI. OBJECTIVES

- To test the impact of dividend announcement on stock prices
- To examine the significance of abnormal returns on the sectoral efficiency in the market.

VII. RESEARCH METHODOLOGY

- **Research Design:** A descriptive design is adopted for the study to describe the market efficiency in semi strong form.
- **Source of Data:** Secondary data which are published in recognised websites.
- **Sample Size:** A sample of five final dividend announcement of 5 companies out of 15 Auto index companies listed in NSE.
- **Study Period:** 2022 - 2023
- **Research Tool:** Event study is the most popular tool used to measure the effectiveness of events on stock prices.
- **Description: Event Window:** 31 days that is -15 days and + 15days, the dividend announcement date is observed as event day that is 0.
- **Window Estimation:** 151 days.
- **Statistical tools:** T - test, Regression Analysis.

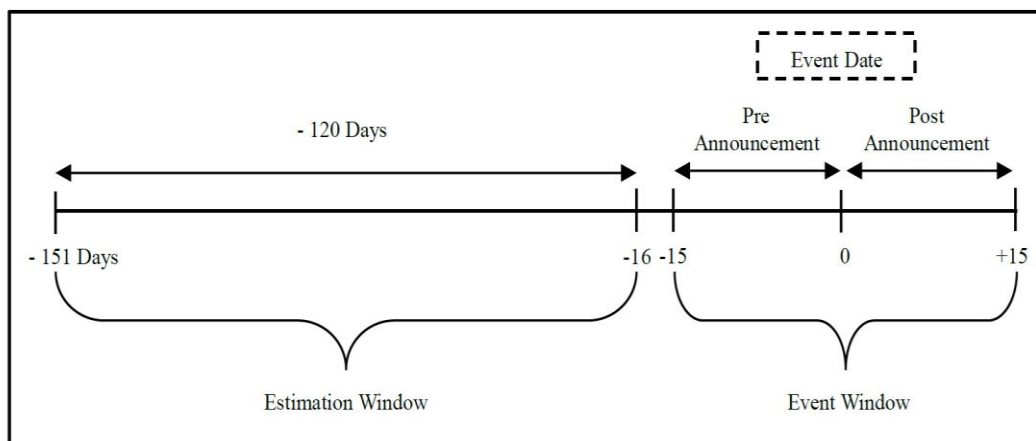


Fig 1 Event Study Estimation and Event Window

VIII. SCOPE OF THE STUDY

The study evaluates the semi-strong form of market efficiency of the selected stocks of NIFTY AUTO Index. It is confined to the abnormal returns on account of final dividend announcements made by the selected Auto sector companies. The study was conducted for the period from 2022 - 2023.

IX. HYPOTHESIS

- H_0 : Abnormal return in the event of dividend announcement is not statistically significant on the NSE AUTO Index efficiency in the market.
- H_1 : Abnormal return in the event of dividend announcement is statistically significant on the NSE AUTO Index efficiency in the market.

X. DATA ANALYSIS AND INTERPRETATION

Table 2 Company Wise Analysis of Abnormal Return, T-Test and P-Value (SAMVARDHANA, MAHINDRA, BAJAJ, HERO MOTO CORP, MRF)

	Events Days	SAMVARDHANA		
		AR	T-Test	P-Value
Pre-Announcement	-15	-0.0005	-0.0153	0.9879
	-14	-0.0237	-0.7984	0.4309
	-13	-0.0320	-1.0800	0.2887
	-12	0.0368	1.2433	0.2234
	-11	-0.0355	-1.1989	0.2399
	-10	0.0195	0.6577	0.5158
	-9	0.0275	0.9265	0.3616
	-8	0.0284	0.9584	0.3455
	-7	0.0188	0.6346	0.5305
	-6	0.0068	0.2311	0.8188
	-5	-0.0130	-0.4371	0.6652
	-4	0.0006	0.0193	0.9848
	-3	0.0229	0.7730	0.4456
	-2	-0.0015	-0.0512	0.9595
	-1	-0.0266	-0.8963	0.3772
	0	0.0152	0.5120	0.6124
Post-Announcement	1	-0.0058	-0.1948	0.8469
	2	0.0054	0.1828	0.8562
	3	0.0450	1.5202	0.1389
	4	0.0020	0.0669	0.9471
	5	-0.0119	-0.4024	0.6902
	6	-0.0002	-0.0073	0.9943
	7	-0.0177	-0.5983	0.5541
	8	-0.0067	-0.2266	0.8223
	9	0.0247	0.8321	0.4119
	10	-0.0020	-0.0679	0.9463
	11	0.0118	0.3969	0.6943
	12	0.0210	0.7073	0.4848
	13	0.0038	0.1294	0.8979
	14	0.0129	0.4342	0.6672
	15	0.0016	0.0541	0.9572

	Events Days	MAHINDRA		
		AR	T-Test	P-Value
Pre-Announcement	-15	0.0079	0.5837	0.5640
	-14	-0.0044	-0.3271	0.7459
	-13	0.0026	0.1914	0.8495
	-12	-0.0023	-0.1720	0.8646
	-11	0.0288	2.1147	0.0432*
	-10	0.0110	0.8069	0.4263
	-9	-0.0191	-1.4027	0.1713
	-8	0.0034	0.2486	0.8054
	-7	-0.0071	-0.5257	0.6031
	-6	-0.0061	-0.4463	0.6587
	-5	0.0440	3.2342	0.0030*

	-4	0.0104	0.7629	0.4517
	-3	-0.0139	-1.0208	0.3158
	-2	-0.0083	-0.6088	0.5474
	-1	0.0124	0.9112	0.3697
	0	0.0268	1.9726	0.0581*
Post-Announcement	1	0.0396	2.9129	0.0068*
	2	0.0158	1.1593	0.2558
	3	-0.0098	-0.7185	0.4782
	4	-0.0132	-0.9702	0.3400
	5	0.0074	0.5458	0.5894
	6	0.0153	1.1281	0.2685
	7	0.0056	0.4086	0.6858
	8	-0.0081	-0.5958	0.5560
	9	0.0086	0.6300	0.5336
	10	-0.0046	-0.3398	0.7365
	11	0.0170	1.2481	0.2220
	12	0.0082	0.6004	0.5529
	13	0.0015	0.1074	0.9152
	14	-0.0036	-0.2683	0.7904
	15	-0.0195	-1.4312	0.1631

	Events Days	BAJAJ		
		AR	T-Test	P-Value
Pre-Announcement	-15	-0.0091	-0.6912	0.4948
	-14	0.0162	1.2280	0.2290
	-13	0.0042	0.3163	0.7540
	-12	0.0072	0.5439	0.5905
	-11	-0.0037	-0.2780	0.7829
	-10	-0.0015	-0.1110	0.9124
	-9	-0.0139	-1.0537	0.3004
	-8	-0.0016	-0.1179	0.9069
	-7	0.0175	1.3274	0.1944
	-6	-0.0063	-0.4751	0.6381
	-5	0.0098	0.7433	0.4631
	-4	-0.0156	-1.1824	0.2463
	-3	-0.0069	-0.5197	0.6071
	-2	0.0205	1.5539	0.1307
	-1	0.0449	3.4023	0.0019*
	0	0.0105	0.7986	0.4308
Post-Announcement	1	-0.0270	-2.0494	0.0493*
	2	-0.0215	-1.6328	0.1130
	3	-0.0273	-2.0687	0.0473*
	4	-0.0185	-1.4037	0.1707
	5	0.0076	0.5782	0.5675
	6	0.0052	0.3952	0.6955
	7	0.0245	1.8611	0.0726*
	8	0.0097	0.7358	0.4676
	9	0.0089	0.6768	0.5037
	10	0.0088	0.6642	0.5117
	11	0.0171	1.3002	0.2034

	12	0.0174	1.3219	0.1962
	13	-0.0115	-0.8717	0.3903
	14	0.0138	1.0484	0.3028
	15	-0.0050	-0.3808	0.7061

	Events Days	HERO MOTO CORP		
		AR	T-Test	P-Value
Pre-Announcement	-15	-0.0014	-0.0904	0.9286
	-14	-0.0039	-0.2572	0.7988
	-13	-0.0066	-0.4333	0.6679
	-12	-0.0056	-0.3719	0.7126
	-11	0.0234	1.5442	0.1330
	-10	0.0042	0.2735	0.7863
	-9	-0.0035	-0.2303	0.8194
	-8	0.0057	0.3781	0.7081
	-7	0.0039	0.2575	0.7986
	-6	0.0116	0.7642	0.4507
	-5	0.0380	2.5044	0.0179*
	-4	0.0487	3.2058	0.0032 *
	-3	-0.0033	-0.2170	0.8296
	-2	0.0055	0.3591	0.7220
	-1	-0.0043	-0.2802	0.7813
	0	-0.0075	-0.4961	0.6234
Post-Announcement	1	0.0388	2.5577	0.0158*
	2	0.0420	2.7653	0.0096*
	3	-0.0198	-1.3052	0.2017
	4	-0.0040	-0.2619	0.7952
	5	0.0062	0.4088	0.6856
	6	-0.0048	-0.3193	0.7517
	7	0.0230	1.5125	0.1409
	8	0.0168	1.1054	0.2778
	9	-0.0128	-0.8430	0.4059
	10	0.0089	0.5831	0.5642
	11	0.0186	1.2223	0.2311
	12	0.0030	0.1983	0.8442
	13	0.0179	1.1814	0.2467
	14	0.0117	0.7689	0.4480
	15	-0.0085	-0.5633	0.5774

	Events Days	MRF		
		AR	T-Test	P-Value
Pre-Announcement	-15	0.0048	0.4867	0.6300
	-14	0.0005	0.0498	0.9606
	-13	0.0145	1.4876	0.1473
	-12	0.0220	2.2566	0.0315*
	-11	0.0011	0.1150	0.9092
	-10	0.0089	0.9159	0.3670
	-9	0.0241	2.4636	0.0197
	-8	0.0197	2.0147	0.0530*
	-7	-0.0045	-0.4561	0.6516

	-6	0.0121	1.2359	0.2261
	-5	0.0009	0.0873	0.9310
	-4	0.0058	0.5982	0.5542
	-3	-0.0085	-0.8668	0.3929
	-2	-0.0064	-0.6539	0.5182
	-1	-0.0137	-1.4024	0.1711
	0	0.0072	0.7348	0.4681
Post-Announcement	1	-0.0060	-0.6121	0.5451
	2	0.0081	0.8333	0.4113
	3	0.0659	6.7458	0.0000*
	4	0.0057	0.5840	0.5636
	5	0.0056	0.5697	0.5731
	6	0.0113	1.1601	0.2551
	7	0.0012	0.1190	0.9061
	8	-0.0071	-0.7240	0.4747
	9	-0.0063	-0.6485	0.5216
	10	0.0185	1.8974	0.0674*
	11	0.0110	1.1280	0.2682
	12	-0.0009	-0.0956	0.9245
	13	-0.0109	-1.1162	0.2732
	14	-0.0003	-0.0356	0.9719
	15	0.0339	3.4666	0.0016*

* Significance Level 5%

The Table -II explains the abnormal returns, T test and P value of five selected AUTO Index companies listed in NSE for 31 days event window. Samvardhana shows the abnormal return are positive for 18 days out of 31 days, and for remaining 13 days shows negative abnormal return. of five selected sample companies and its corresponding P value for the 31 days event window. The p value of Samvardhana correspond to the value of T test for abnormal returns, it states that there is no significant variation in the abnormal return for all the days of event. This shows that market is efficient and the investors can earn only normal return. Therefore, null hypothesis is accepted.

Abnormal returns of Mahindra & Mahindra are positive for 18 days and for the remaining 13 days, it shows negative returns. The p value of the company reveals that there is a significant variation in abnormal return for pre-event day -11 and -5, post event day +1 and event day (0). This states the market is inefficient and the investors can earn abnormal return, therefore null hypothesis rejected. Apart from the above four days of the event window the market for remaining 27 days is efficient and the investors cannot earn abnormal returns, therefore null hypothesis accepted.

Out of 31 days window the abnormal returns of Bajaj Co. are positive for 17 days and negative for 14 days. The p value on -1, +1, +3, +7 of event days represent there is a significant variation in abnormal returns that indicates market is inefficient. Hence the null hypothesis is rejected.

Excluding the four days the market is efficient and investors cannot make abnormal return. Therefore, null hypothesis is accepted for remaining 27 days.

The Hero motor Corp company abnormal returns are positive for 18 days and negative for 13 days out of 31 event days. The companies p value shows that there is a significant variation on -5, -4, +1, and +2 event days in the abnormal return. This shows that the market is inefficient and the investors can earn abnormal returns therefore the null hypothesis is rejected. Excluding the above 4 event days the market is efficient for all the remaining days of event and the investors cannot make abnormal returns. Hence the null hypothesis is accepted.

MRF Company reveals that the abnormal returns are positive for 21 days and negative for 10 days out of 31 days event window. The p value of MRF shows there is a significant variation in abnormal return for -12, -9, -8, +3, +10 and +15 days respectively. This represents that the market is inefficient and the investors can make abnormal returns so the null hypothesis is rejected. The market is efficient for the remaining days excluding pre and post 3 days each where, the investors cannot earn abnormal return. So, the null hypothesis is accepted.

➤ *Interpretation:*

From the above table -II shows the overall abnormal returns in the event window of individual five selected companies of AUTO Index listed in NSE. The observation reveals that there is a slight variation for few days in the abnormal returns during the pre, post and event day for all the companies. The p values of each company are tested at 5% level of significance which supports that abnormal return in the event of dividend announcement is not statically significant on the NSE AUTO Index efficiency in the market. This shows that the investors cannot earn abnormal returns. Therefore, the null hypothesis is accepted with respect to all the selected companies.

Table 3Average Abnormal Returns, Cumulative Average Abnormal Returns, T-Test And Its P-Value

	Events Days	AAR	CAAR	T-Test	P-Value
Pre-Announcement	-15	0.0004	0.0004	0.0246	0.9806
	-14	-0.0031	-0.0027	-0.1638	0.8710
	-13	-0.0035	-0.0061	-0.3761	0.3347
	-12	0.0116	0.0055	0.3377	0.7380
	-11	0.0028	0.0083	0.5113	0.6129
	-10	0.0084	0.0167	1.0287	0.3119
	-9	0.0030	0.0198	1.2137	0.2343
	-8	0.0111	0.0309	1.8975	0.0674*
	-7	0.0057	0.0366	2.2492	0.0320*
	-6	0.0036	0.0402	2.4727	0.0193*
	-5	0.0159	0.0562	3.4522	0.0017*
	-4	0.0100	0.0662	4.0648	0.0003*
	-3	-0.0019	0.0642	3.9469	0.0004*
	-2	0.0020	0.0662	4.0669	0.0003*
-1	0.0026	0.0687	4.2236	0.0002*	
	0	0.0104	0.0792	4.8649	0.0000*
Post-Announcement	1	0.0079	0.0871	5.3522	0.0000*
	2	0.0100	0.0971	5.9638	0.0000*
	3	0.0108	0.1079	6.6285	0.0000*
	4	-0.0056	0.1023	6.2844	0.0000*
	5	0.0030	0.1053	6.4675	0.0000*
	6	0.0054	0.1106	6.7972	0.0000*
	7	0.0073	0.1179	7.2456	0.0000*
	8	0.0009	0.1188	7.3020	0.0000*
	9	0.0046	0.1234	7.5850	0.0000*
	10	0.0059	0.1293	7.9477	0.0000*
	11	0.0151	0.1444	8.8750	0.0000*
	12	0.0097	0.1542	9.4727	0.0000*
	13	0.0002	0.1543	9.4828	0.0000*
	14	0.0069	0.1612	9.9052	0.0000*
15	0.0005	0.1617	9.9351	0.0000*	

* Significance Level 5%

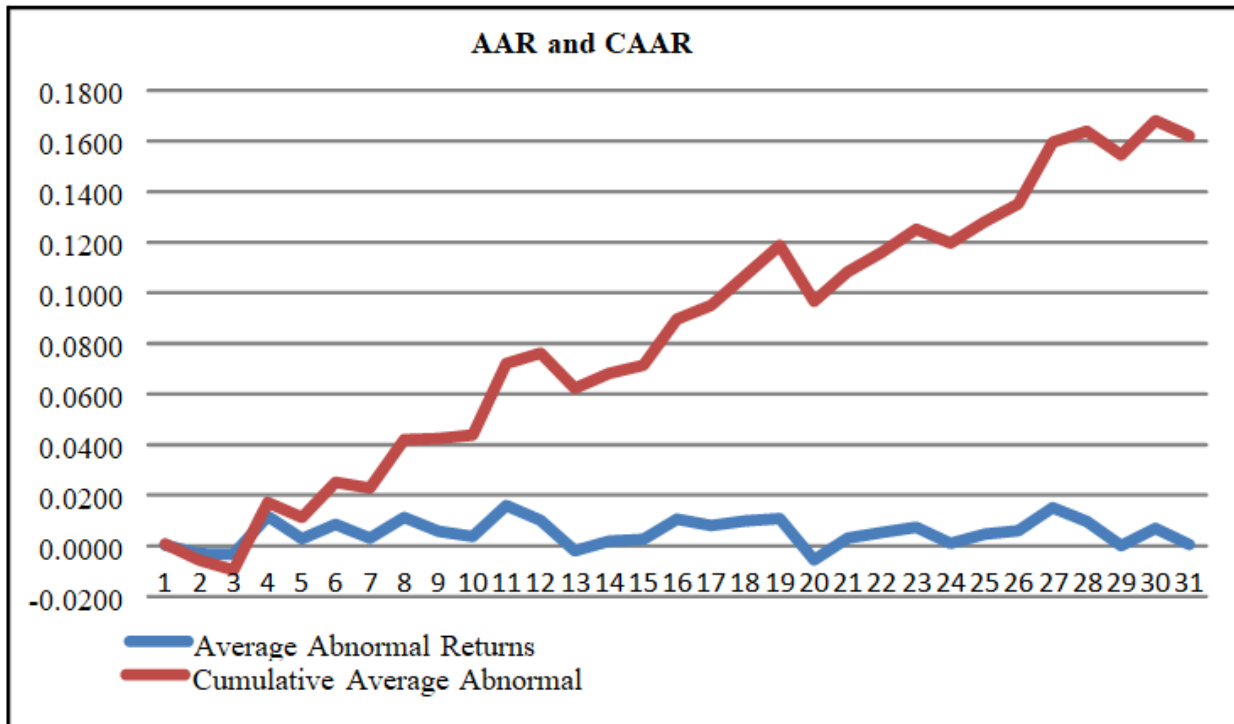


Chart – I Average Abnormal Returns and Cumulative Average Abnormal Returns

The above table - III and chart 1 shows the overall average abnormal return and cumulative average abnormal return, T test and P value for selected sample companies of AUTO Index listed in NSE.

Overall average abnormal return out of 31 days window period on event of dividend announcement 4 days shows negative average abnormal return and remaining 27 days shows positive abnormal returns. During the pre and post announcement period 3 days and 1 day were earned negative returns respectively. The remaining pre and post announcement window days earned the positive returns

Overall cumulative average abnormal return out of 31 days window period on event of dividend announcement 2 days shows negative returns and remaining 29 days shows positive returns.

The hypothesis has been tested by applying T test at 5% significance level of abnormal returns during the event window using p values. The above table and chart show there is a significant variation in abnormal returns during pre and post dividend announcement, except from the period -15th day to -9th day of pre announcement day of the event.

➤ *Interpretation:*

The above table and chart represent AAR, CAAR, T value and P value of selected AUTO Index companies listed in NSE during the dividend announcement period. Out of 31 days event window period 24 days has P value less than 0.005, which indicates null hypothesis has to be rejected as the investors can make abnormal returns. It is a clear indication of the information of all the stock prices were not properly disseminated.

XI. RESULTS AND DISCUSSION

The study observed that the abnormal returns of individual stocks during assessment are not showing notable variations whereas the cumulative average abnormal returns of all the selected stocks are showing notable variation that the investors can earn significant abnormal returns during the event of dividend announcement.

Samvardhana stocks have not shown any significant variation in the abnormal return on any of the day during event window. **Mahindra and Mahindra Ltd** have shown the significant variations in the abnormal return on the event day of dividend announcement. **Bajaj Co** stocks shows the significant variation before one day of the event and immediate next days of the event. **Hero motor Corp** stocks shows the significant variation before one day of the event and immediate next days of the event **MRF stocks** shows the significant variation during both pre and post event day during event window. So, it is suggested to buy and hold more shares.

XII. SUGGESTIONS

The inference of the study discloses that the MRF Ltd, Mahindra and Mahindra, Bajaj Auto Ltd, Hero Motor Corp, except Samvardhana Motherson have earned significant variations in the abnormal return after the day of dividend announcement, Samvardhana stocks does not shows any variations during the event window So it is suggested to buy and hold more shares. Hence it is suggested to sell those shares. To avoid the negative abnormal return, the investors are suggested to engage in short selling and approach for insiders' information.

XIII. CONCLUSIONS

The study examined the market efficiency in the semi-strong form in connection to the dividend announcements made by selected sample stocks of Nifty AUTO Index. The stocks were assessed over the period from 2022 – 2023 by using econometric models under event study methodology and statistical T-tests and P-values. The study initiated the impact of dividend announcements on stock prices which represents the market efficiency. The findings, based on Average Abnormal Returns (AAR) of individual stocks indicated that the investors cannot able made significant abnormal returns as the market incorporates the dividend announcement information whereas the Cumulative average abnormal returns combining all the stocks shows notable abnormal returns surrounding the event indicating that the information was not properly disseminated. In closure the investors are advised that not to make hurry decisions during the event announcement and to make portfolio to mitigate any kind of risk associated in investment expedition.

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