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An Examination of Market Efficiency around Merger and Acquisition Events in Indian Healthcare Industry

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ABSTRACT: *BSE Healthcare industry index performance in the past several years has seen lacklustre performance in the stock markets. The expectations of growth in the healthcare industry has been nominal with resistance levels never breached for several years. But, the pandemic of covid-19 changed this scenario dramatically with healthcare sector observing above normal trades and breaching all records in the period from January 2020 to July 2020. In case of Healthcare industry, the key events comprising of product line introductions or merger and acquisition found dreary interest from the investors in the past.But, considering the recent surges in the stock returns in the healthcare industry, many merger and acquisitions and product introduction might in pipeline soon. This paper thus focuses on understanding the effects of mergers and acquisitions on the stock prices of the companies in the Indian healthcare industry from 2011 and tries to evaluate its relevance in the present context. The findings of the study reveal that the markets are semi-strong form efficient in nature and all news are already factored in the prices giving no space for earning abnormal returns.*

KEY WORDS AND PHRASES: *Healthcare sector, Merger, Acquisitions, Stock exchange, Event study, Market efficiency*

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I. INTRODUCTION AND LITERATURE REVIEW

The year 2020 started off with a rousing expectations for a better global overall growth conditions in business environment throughout the world and specifically in India. Healthcare industry was expected to perform at the nominal levels looking at the short term and long term trend in the previous years. But, the news and expectations of global outbreak of corona-19 virus led the markets into an environment of fear and turbulence, but provided an opportunity for healthcare sector companies to revive the confidence of the investors in expectations of better growth. For the first time in 4 years, BSE Healthcare index crossed the resistance level of 16950 on 21st July, 2020. This is very surprising considering the fact that the, index was hovering between 13000 to 14500 levels for the last 4 years from January 2016 to July 2020 as observed in Figure 1.

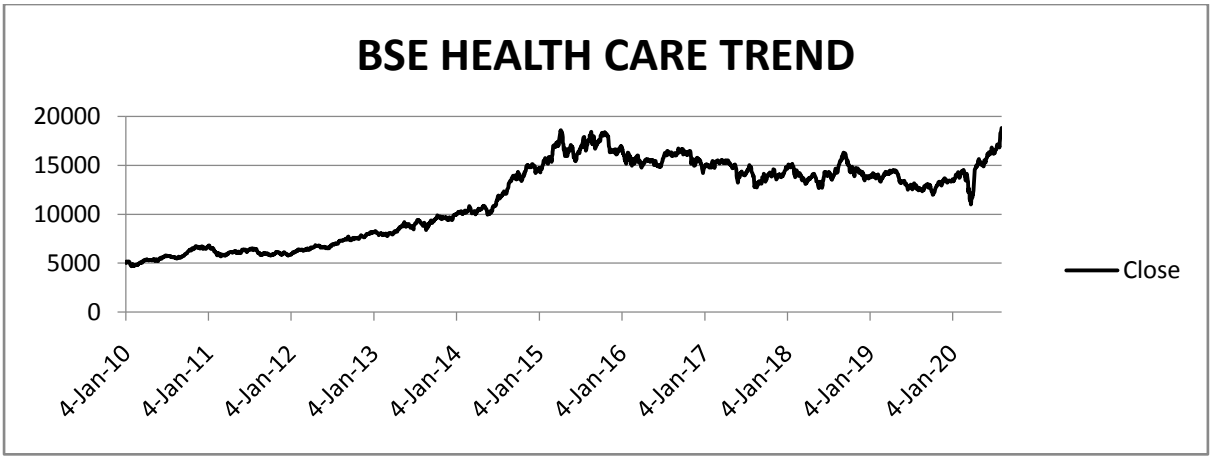

Figure 1: Performance of BSE Healthcare from 2011 to July, 2020

Source: Bseindia.com

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The healthcare industry has been overwhelmingly convoluted in improving infrastructure and providing world class treatment to the patients with curative and preventive care along with lending themselves to reconstruction, and re-establishment of confidence in the minds of the public and investors. This revival is evident looking at the post-2020 period trend which can be attributed to many fundamental and structural changes which is one of the key expectations of the investors. According to Indian Brand Equity Foundation(Ibef), the Indian healthcare sector was expected to have market potential of Rs 19,56,920crore (US$ 280 billion) by 2020 with compared to its standing at Rs 4 lakh crore (US$ 61.79 billion) in 2017. It was further expected that the healthcare sector would have a market potential of Rs 8,60,000 crore (US$ 132.84 billion) by FY22. But considering the current momentum, the numbers can be inferred to be realistic and can surpass these numbers, considering the market rally observed in the recent few months.

Thus, the recent investments in the healthcare sector and growing interests of Foreign Direct Investment (FDI) and Foreign Portfolio Investments (FPI), we might expect the healthcare industry to observe many unfulfilled latent merger and acquisition deals which might bear fruit within shorter horizons and thus higher returns. In the past two to three years, the Indian healthcare sector was observed to be growing at a brisk pace with mergers and acquisitions being mainly viewed as a functional tie-up. According to Indian Brand Equity Foundation(Ibef), "the total value of Merger and Acquisitions (M&A) transactions in the healthcare sector was recorded to be at Rs. 7615 crores in the fiscal year of 2019, which is 155 percent increase from previous year of Rs. 2991 crores" . This healthy growth was unusual in nature due to the reason that, till 2017, the sector had recorded the bare minimum gains due to pressure on margins and due to other regulatory actions. This is also evident from the study by Hetanshi Shah(2018) who examined the trends in mergers and acquisitions in India post-1991 LPG reforms, focusing on Pharmaceutical sector based on ownership pattern of merged and merging entity, size of firms and type of merger. The data was considered between the period from 1991to 2017 and the study concludes that there was no massive or significant change in financial performance of the merged entities. Similarly, Md.Alam Ansari and M. Mustafa (2018)examined and evaluated the impact of mergers and acquisitions on the liquidity and leverage position of the companies and suggested appropriate strategy for merger and acquisition of Indian industry. The conclusion drawn points towards no significant effect of the merger on the business of the firm and thus reflects no changes in the returns. The market efficiency has been tested by many researchers where impact of merger and acquisition has been examined in other industries including healthcare sectors. Harpreet Singh Bedi (2010)examined the presence of trends and progress of mergers and acquisitions in generic to several sectors within which healthcare sector was also considered. It was observed that the amount of mergers and acquisitions deals increased by 615 percent during 2001-07, majority of the increase was in the manufacturing service sector but since healthcare was at the nascent stage, only a meagre amount of companies actually preferred that route.The results of no significant opportunity for abnormal returns was inferred by many researchers in India. Amish BharatkumarSoni (2016), examined how the mergers and acquisitions of Indian companies will impact the wealth of shareholders by considering the pre and post merger returns for 10 Indian companies listed in the Bombay/Mumbai Stock Exchange (BSE). The author found no significance differences in the returns pointing towards markets being semi-strong efficient in nature. Similar studies have being undertaken in the recent years in the context of other growing economies. Chen Yadonget.al(2019) examined whether mergers and acquisitions improve the financial performance of Chinese listed companies. The data was collected for 434 completed merger and acquisition deals between the time period 2012 to 2016 listed on the Shanghai and Shenzhen Stock Exchanges. The research concluded that, horizontal M&A and conglomerate M&A are positively related to the firms performance.

II. RESEARCH PROBLEM

As evident from literature review, merger and acquisitions has been used by the companies as a signal for possible reconciliation and thus improvement in its operations triggering an indication for possible opportunity of uptrend in its future earnings. If this is true, possible future revisions should be discounted in the current prices providing no opportunity for earning abnormal returns. This signalling hypothesis has been examined by the market reaction around the M & A deals which were considered very important from a strategic view point. The study would thus pave as reference for future deals which can more strategically driven and which are already been in pipeline according to industry experts.

III. OBJECTIVES OF THE STUDY

1. To examine the performance of stock returns around M & A deals.
2. To evaluate and test the signalling hypothesis of equality of mean returns around the announcement date.

IV. DATA COLLECTION AND RESEARCH METHODOLOGY

In order to analyse the impact of mergers and acquisitions on the stock prices of the companies, the event study methodology is used. The data is collected from secondary sources such as Money control, Yahoo

Finance, BSE website and National Stock Exchange websites.For the study a sample of 15 merger and acquisitions events were considered in healthcare industry based on their strategic importance. In order to examine the performance of the company returns post the merger, the data of the acquirer companies were considered. The data mainly comprised of closing prices data of 15 listed companies for period of one year before and after the merger. The list of companies and the timeline considered for analysis is given in the Table 1 below:

Sl. No	Acquirer Company	Time Period
1	Abbott India	21st May, 2009 to 20th May 2011
2	Apollo Hospitals	17th September 2013 to 16th September 2015
3	Aurobindo pharma	13th September 2012 to 12th September 2014
4	Biocon Limited	12th February 2007 to 10th February 2009
5	Cipla Limited	8th February 2018 to 7th February 2020
6	Dr. Reddy's Laboratories Limited	13th April 2018 to 9th April 2020
7	Fortis Healthcare Limited	16th January 2018 to 15th January 2020
8	Glenmark Pharmaceuticals	26th October 2004 to 23rd October 2006
9	Hikal Limited	8th September 2003 to 5th September 2005
10	Indoco Remedies Limited	21st September 2015 to 20th September 2017
11	IPCA Laboratories	18th January 2017 to 17th January 2019
12	Lupin Limited	23rd July 2014 to 22nd July 2016
13	Narayana Health	3rd January 2017 to 2nd January 2019
14	Natco Pharma	6th February 2007 to 5th February 2009
15	TejnakshHelathcare Limited	6th January 2016 to 5th January 2018

Table 1: Companies considered for the study with respective time periods

Source: Authors

The methodology considered in the study is based on event study methodology (Brown and Warner, 1985). The methodology helps to find the Cumulative Average Abnormal Returns of the respective share prices around the event date. The market would be considered inefficient in nature, if there is a possibility of any gains around the event date. For the study, the date of the M & A deal was considered as the event date and 30 days surrounding the event date (15 days prior and 15 days after) is denoted as "event window" period. 30 days prior to the last day of the event window period is considered as the "estimation window" period. For all calculations, BSE Healthcare index returns were considered as the proxy for the market index.

We measure the stock returns and index returns as the continuously compounded daily change as shown with:

$$r_t = (\ln P_t - \ln P_{t-1}) * 100$$

Where, r_t is the return for period 't', P_t is the monthly closing share price of the sensex for period 't' and "ln" is natural logarithm

We know that, the results of the regression which will be done in the next step will be spurious if the dependent variable is non-stationary. Thus, we determine whether the all the stock returns and index returns are stationary in nature. We examine the stationarity by conducting Augmented Dickey Fuller (ADF) Test. The ADF test is a common method for determining the unit roots. It consists of regressing the first difference of the series against a constant, the series lagged one period, the difference series of 'n' lag lengths and a time trend (Pindyck and Rubinfeld, 1998, p. 509).

$$\Delta r_t = \alpha + \sum_{i=1}^{n} \beta_i \Delta r_{t-1} + \lambda t + \rho r_{t-1} + \varepsilon_t$$

Thus, if the coefficient of ρ is significantly different from zero, then the hypothesis that r is non-stationary is rejected.

In order to obtain the regression coefficients, the returns of each acquirer company returns were regressed with market index returns for the estimation window period. The first order regression used as the first step in the regression analysis is as follows:

$$\bar{R}_{it} = \alpha_i + \beta_i \bar{R}_{mt} + \varepsilon_{it}$$

Where, $\bar{R}_{it}$ = expected return on security 'i' on day 't'

$\bar{R}_{mt}$ = return on the market portfolio on day 't'

β_i= systematic risk component of security 'i'

α_i = intercept term for security 'i'

ε_{it} = white noise error term to security 'i' on day 't' having zero mean and constant variance.

These coefficients were used in calculating the abnormal returns in the event window period. The deviation of the actual returns from the expected return is the abnormal returns and is given mathematically as follows:

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

Where,

AR_{it} = abnormal return on security 'i' on day 't'

R_{it} = actual return on security 'i' on day 't'

In order to examine the hypothesis of whether there are any significant differences in the abnormal returns in the event window period around the event day of security 'i', two-sample t-test assuming unequal variance was conducted. The t-statistic for testing two populations with unequal variance was calculated using the following formula:

$$t = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\left(\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}\right)}}$$

Where the corresponding degrees of freedom is given by

$$df = \left\lfloor \frac{S_u^4}{\frac{\left(S_1^2/n_1\right)^2}{n_1 - 1} + \frac{\left(S_2^2/n_2\right)^2}{n_1 - 1}} \right\rfloor$$

where, $S_u = \sqrt{\left(\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}\right)}$

Thus, the parametric t-test for abnormal returns around the event periods assuming unequal variance was tested with the following hypothesis for individual security as follows:

H0: There is no significant difference in the abnormal returns around the event period

H1: There is significant difference in the abnormal returns around the event period

The average abnormal returns of the securities on each relative day 't' were calculated as:

$$\mathrm{AAR_t} = \frac{1}{\mathrm{N}} \sum_{\mathrm{i=1}}^{\mathrm{N}} \mathrm{AR_{it}}$$

Where, N= number of securities on day't'

The cumulative average abnormal returns(CAAR) are calculated as the sum of daily average of cumulative abnormal returns over the event time.

Thus, the CAAR for period t = a until t = b is defined as follows:

$$CAAR_{ab} = \sum_{i=a}^{b} AAR_t$$

Day '0' is defined as the 'event day' i.e. day on which M& A deal is announced. Thus, the t-statistic that tests whether the average excess returns of the portfolio for the day is significantly different from 0 is calculated by

$$AAR_t = \frac{AAR_t}{\sqrt{variance\ of\ AAR_t}}$$

Thus, assuming independence across all the days, the t-statistic for CAAR for a period of T days from day 'a' to 'b' was calculated as

$$CAAR_t = \frac{CAAR_t}{\sqrt{variance\ of\ AAR_t * t}}$$

Thus, the parametric t-test for equality of means for the returns around the event period considering all the securities is tested with:

H0: There is no significant difference in mean returns around the event period

H1: There is significant difference in mean returns around the event period.

V. DATA ANALYSIS AND INTERPRETATION

Firstly, in order to examine whether the return series was stationary or not, ADF test was conducted and for all the stock and index, the return form of the data was observed to be stationary in nature at 5 percent level of significance. Thus, we can infer that, the data is integrated to order-1. The results of the ADF test is provided in Appendix.

We first present the descriptive statistics of all the fifteen companies around the event day.

	Mean around event day		Standard Deviation around event day		Percentage of Positive Days	
Company	Before the event day (-15 to -1)	After the event day (+1 to +15)	Before the event day (-15 to -1)	After the event day (+1 to +15)	Before the event day (-15 to -1)	After the event day (+1 to +15)
Abbott India	0.691	-0.036	4.592	2.492	60%	60%
Apollo Hospitals	-0.986	-0.911	1.480	2.219	60%	47%

AUROBINDO PHARMA LIMITED	-1.240	0.341	2.081	1.751	73%	67%
BIOCON LIMITED	-1.041	0.251	4.043	1.613	53%	60%
CIPLA LIMITED	0.349	0.287	1.792	0.825	53%	67%
DR REDDY'S LABORATORIES LIMITED	0.210	0.603	1.496	1.077	53%	33%
FORTIS HEALTHCARE LIMITED	0.214	-0.025	0.915	0.445	60%	47%
GLENMARK PHARMACEUTICALS	0.307	-1.059	2.478	2.488	13%	67%
HIKAL LIMITED	0.662	-0.583	1.717	1.338	60%	87%
INDOCO REMEDIES LIMITED	-0.092	-0.516	1.712	1.520	53%	40%
IPCA LABORATORIES	-0.742	-0.360	1.170	1.668	40%	47%
LUPIN LIMITED	-0.608	-0.542	1.390	1.460	80%	53%
NARAYANA HEALTH	0.033	-0.302	1.122	0.526	60%	60%
NATCO PHARMA	-1.511	-1.080	5.736	2.188	53%	53%
TEJNAKSH HEALTHCARE LIMITED	-1.879	-1.061	4.146	3.716	60%	53%
	AVERAGE ABNORMAL RETURNS				**AVERAGE PERCENTAGE OF POSITIVE DAYS**	
	-0.376	-0.333			56%	56%

Table 2: Summary statistics of the returns around the event day

Since the event day for each company is different, we have taken x-axis as the time indicator around the event day instead of specifying the dates in Table-2. As observed, the stock average returns before and after the event tend to be negative in nature. But, as there exists many outliers, considering only average would not be helpful. As observed from the mean around the events, out of 15 events, 8 M & A events were negatively perceived in the market, with significant deviations being observed in case of Natco Pharma and Tejanaksh Healthcare limited stocks. In expectations of the M & A events, we find standard deviation around the events to be much higher compared to after the events. But, noteworthy is the case of Natco Pharma and Tejanaksh Healthcare limited M & A where more variations were observed. In the event to M & A of the companies, we find markets to be often bullish in nature considering the percentage of positive days except in case of few events.

In order to examine whether statistically there appears to be significant differences in the mean of the returns around the event day, parametric t-test assuming unequal variances were considered. The results of the t-test for the equality of means at 5 percent level of significance for the abnormal returns for each event 15 days prior and 15 days after the M&A event is provided in Table 3.

	Mean around event day		**t-test results**	
COMPANY	Before the event day (-15 to -1)	After the event day (+1 to +15)	t-stat value	P-value
ABBOTT INDIA	0.691	-0.036	0.592	0.564
APOLLO HOSPITALS	-0.986	-0.911	-0.115	0.910
AUROBINDO PHARMA LIMITED	-1.240	0.341	-2.260	0.040**
BIOCON LIMITED	-1.041	0.251	-1.223	0.241
CIPLA LIMITED	0.349	0.287	0.125	0.902
DR REDDY'S LABORATORIES LIMITED	0.210	0.603	-0.867	0.400
FORTIS HEALTHCARE LIMITED	0.214	-0.025	0.880	0.393
GLENMARK PHARMACEUTICALS	0.307	-1.059	1.360	0.195
HIKAL LIMITED	0.662	-0.583	2.913	0.011**
INDOCO REMEDIES LIMITED	-0.092	-0.516	0.692	0.500
IPCA LABORATORIES	-0.742	-0.360	-0.814	0.429
LUPIN LIMITED	-0.608	-0.542	-0.125	0.903
NARAYANA HEALTH	0.033	-0.302	1.154	0.268
NATCO PHARMA	-1.511	-1.080	-0.312	0.760
TEJNAKSH HEALTHCARE LIMITED	-1.879	-1.061	-0.679	0.508

Table 3: The parametric t-test results of stock returns around event day

As observed from Table-3, we can infer that, the null hypothesis of no significant differences in the stock returns around the event day is accepted in majority of the cases at 5 percent level of significance. Only in case of stock returns of the Acquirer companies being Aurobindo pharma limited and Hikai limited, we find significant differences in the stock returns. Thus, we can conclude that there is no significant impact of the M&A events on the stock returns.

Consider the AAR trend and CAAR trend in Figure-2 and Figure-3 preceding to the event and after the event.

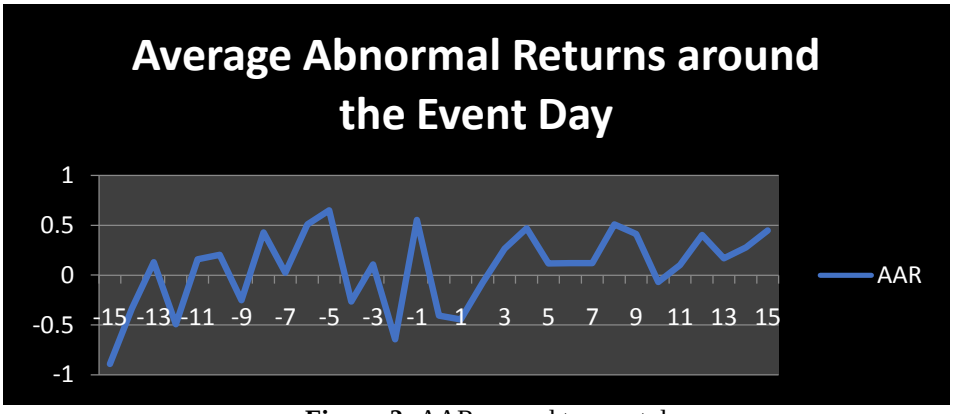

Figure-2: AAR around to event day

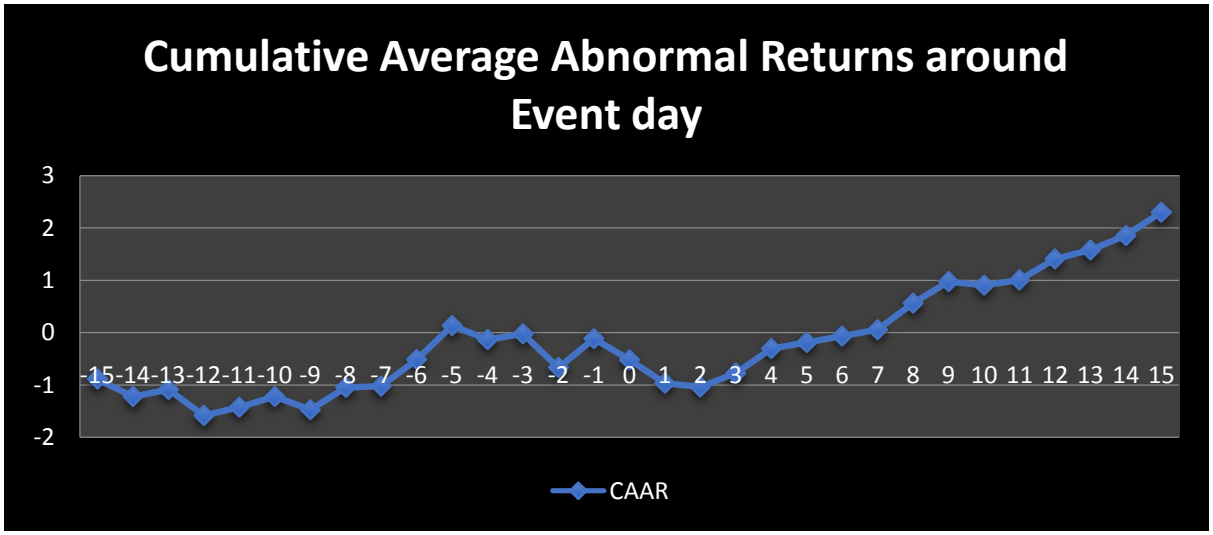

Figure-3 CAAR around the M&A events

Source: Authors

From Figure-3, we can infer that, the participants in the market definitely expect the announcements and thus markets are able to adjust to the news accordingly. Preceding to the event, we expect the markets to react negatively to the M&A announcements but after getting more clarity from the M&A post the event, there is observed to be a general surge in the stock price returns. But, the t-statistic calculated for AAR and CAAR for the test that the average excess returns for the portfolio for each specific day is found not to be significantly different from zero as observed in Table 4. Thus the markets are observed to efficient in nature and there is found to be no possibility for making abnormal returns by adopting any trading strategy.

VI. CONCLUSION

The study was conducted to examine the impact of M&A events in the healthcare sector pertaining to few important companies during the past decade and were evaluated for any inconsistencies in stock patterns which would pave way for earning abnormal profits. The study mainly comprised of evaluating the trends by considered not only the abnormal returns as done in many research papers but also considering the average abnormal returns(AAR) and the cumulative average abnormal returns (CAAR). From the analysis, it can be concluded that, the M&A events which are considered very important taking into account its strategic and

operational stand-point appear to be assimilated in the stock prices gradually without providing much opportunity for abnormal returns around the announcement date. But, the trend in AAR and CAAR points towards markets always being pessimistic in nature before the announcement date to the M&A events and we observe surge in these values more often after the announcement date as their would appear more clarity on the M&A deals. Statistically we find no significant influence of the news in making abnormal profits, thus supporting the semi-strong form of efficiency as observed in the literature.

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APPENDIX

LAG	AAR	t AAR	CAAR	t AAR		LAG	AAR	t AAR	CAAR	t AAR
-15	-0.89	-0.44	-0.89	-0.44		1	-0.44	-0.35	-0.97	-0.15
-14	-0.33	-0.18	-1.22	-0.33		2	-0.07	-0.07	-1.04	-0.16
-13	0.13	0.08	-1.09	-0.37		3	0.26	0.22	-0.78	-0.12
-12	-0.49	-0.21	-1.58	-0.35		4	0.47	0.40	-0.31	-0.05
-11	0.16	0.06	-1.43	-0.28		5	0.12	0.09	-0.19	-0.03
-10	0.20	0.16	-1.22	-0.26		6	0.12	0.09	-0.07	-0.01
-9	-0.25	-0.14	-1.48	-0.26		7	0.12	0.13	0.05	0.01
-8	0.43	0.23	-1.05	-0.24		8	0.51	0.38	0.56	0.10
-7	0.03	0.02	-1.02	-0.21		9	0.41	0.42	0.97	0.17
-6	0.51	0.62	-0.52	-0.11		10	-0.07	-0.07	0.90	0.15
-5	0.65	0.58	0.13	0.03		11	0.10	0.09	1.01	0.17
-4	-0.27	-0.23	-0.13	-0.03		12	0.40	0.52	1.41	0.25
-3	0.11	0.16	-0.03	0.00		13	0.17	0.14	1.58	0.28
-2	-0.64	-0.28	-0.67	-0.12		14	0.28	0.28	1.85	0.32
-1	0.55	0.61	-0.12	-0.02		15	0.45	0.30	2.30	0.43
0	-0.41	-0.47	-0.52	-0.09						

Table 4: The values of AAR, CAAR and t-values respectively around M&A event day

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