

## Share Price Behaviour of Indian Pharmaceutical Companies

Ms. S. Padmavathy<sup>1</sup>, Dr. J. Ashok<sup>2</sup>

<sup>1</sup>Asst. Professor, Department of Management Studies, Kongu Engineering College, Erode, Tamilnadu, India - 638052. [padmaarasu@gmail.com](mailto:padmaarasu@gmail.com).

<sup>2</sup>Professor, School of Management Studies, Bannari Amman Institute of Technology, Sathy, Tamilnadu, India.

**Abstract:** The aim of the study is to investigate the share price behaviour of Indian Pharma Companies which enter into merger activity during the year 2007-2011. An event study was conducted to find out the abnormal return gained by 16 companies listed in National Stock Exchange (NSE). The behaviour of Abnormal Return (AR), Average Abnormal Return (ARR), Cumulative Average Abnormal Return (CAAR) were computed for 20 days before the merger announcements and 20 days after the event day by comparing the closing price of the Acquiring companies with that of the Nifty (NSE Index) The study found that the announcement of merger has no impact on the movements of the share price and no significant abnormal return is gained during the event window of 41 days (i.e., -20 to +20) by the Acquiring companies' shareholders. Therefore the study concluded that a merger announcement has no impact on the Pharmaceutical industry of the Indian stock market during the study period 2007 to 2011.

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### 1. Introduction

Merger and Acquisition plays an important role in this global era to enter a new market. Many companies see this as a way to increase the market share, grow in their size, use the surplus funds, acquire technology, tax concession etc. In India the merger took place in the year 2006 was 65, in 2007 it increased to 175, in 2008 and 2009 it is 153 and 75 respectively and in 2010 and 2011 it is 153 and 156 respectively which is increasing year after year except during 2009.

The share market also expands constantly and the value and volume of trade is increasing. Many retail investors are investing on hearing the news and announcements made by the Organizations. This study helps the investors to decide when to invest in Pharmaceutical companies on hearing merger announcements.

There are many studies to analyse the financial aspects of the pharmaceutical companies (fundamental analyses) where as only limited study prevails to assess the performance of the shares of those companies which make merger announcements and its impact on share price behaviour (technical analyses). This is an attempt to study the share price behaviour, of the pharmaceutical companies when they announce mergers through event study.

### 2. Review

Jayaraman, N., Mandelker, G. and Shastri, K. (1991) empirically examines the possibility that there is leakage of information regarding a merger prior to the announcement of the first bid for the target firm. The tests for the existence of market anticipation are

based on the behavior of variances implied in the premia of call options listed on the target firms' stocks and concluded that the evidence is consistent with the hypothesis that the market anticipates an acquisition prior to the first announcement.

Kanwal Iqbal Khan (2003) paper is an attempt to explain the effect of dividend announcements on stock prices of chemical and pharmaceutical industry of Pakistan. Results indicate that Cash Dividend, Retention Ratio and Return on Equity has significant positive relation with stock market prices and significantly explains the variations in the stock prices of chemical and pharmaceutical sector of Pakistan while Earnings per Share and Stock Dividends have negative insignificant relation with stock prices. Sturm, Dowling and Röder (2007) investigated the stock price behavior using event study methodology of public pharmaceutical and biotechnology companies upon approval of a drug by the Food and Drug Administration (FDA).

Umid Akhmedov, Keith Jakob (2009) examine ex-dividend day behavior on the Copenhagen Stock Exchange and reported the price-drop ratios of 32% and 18% for close-to-close and close-to-open samples respectively, well below the ratios observed in the U.S. The findings are generally consistent with limit-order adjustment explanations from recent literature. In Denmark a unique average-price trading opportunity makes it possible for investors to capture dividends without directly altering supply or demand in the regular market, and therefore not necessarily driving the price-drop ratios toward one.

### 3. Methodology

The data collected for the study is from Center for Monitoring Indian Economy PROWESS database of those Pharmaceuticals Company announces acquisition and their closing share prices during the year 2007 to 2011. There were 16 pharmaceutical companies listed in National Stock Exchange.

The objective of the study is to analyse the impact of the Merger and Acquisition made by the Indian pharmaceuticals companies between 2007 and 2011.

The Event Study methodology is used to calculate the abnormal return earned by the shareholders of pharmaceutical companies on the event window during the 41 days (i.e., 20 days before the merger announcements and after 20 days) during the year 2007 and 2011. For the estimation of intercept and slope, 200 days before and 200 days after the event windows are used.

There were many models to calculate abnormal return of each company's stock based on a relative benchmark. Most of these methods and models of the return generating process on which they are based are discussed. (Brown and Warner, 1980)

The Abnormal Returns are calculated over the event period are as follows:

$$AR(i,t) = R(i,t) - E(R(i,t)) \text{-----(1)}$$

$$CAR = \sum_{t=t_1}^{t_2} AR(i,t) \text{----- (2)}$$

Where  $CAR_i(t_1, t_2)$  is the Cumulative Abnormal Return for firm  $i$  over the specified event window  $(t_1, t_2)$ . Where  $R_{i,t}$  is the actual ex post return on the stock price for firm  $i$  on event date  $t$  and  $E(R_{i,t})$  is the normal return on the stock price for firm  $i$  on event date  $t$ . The normal return  $E(R_{i,t})$  is defined as the expectation period that is typically prior to and does not overlap with the event window (McWilliams & Siegel, 1997)

Stock returns are calculated as:

$$R(i,t) = (P(i,t) - P(i,t-1)) / (P(i,t-1)) \text{-----(3)}$$

Where  $P_{i,t}$  is the stock price of firm  $i$  on day  $t$  and  $P_{i,t-1}$  is the previous day stock price of firm  $i$  on day  $t-1$

The Theoretical return is computed using an Ordinary Least Square (OLS) market model of the normal stock price behavior (Stephen J. Brown & Jerold B. Warner, 1985)

Theoretical return is calculated as

$$E(R(i,t)) = \alpha_i + \beta_i R(m,t) + \epsilon(i,t) \text{-----(4)}$$

Where  $\alpha_i$  is a stable component of security returns and is constant over time;  $\beta_i$  is the market risk coefficient to a measurement of the systematic risk of security  $i$  and is assumed to be constant over time.  $R(m,t)$  is the return of the market on day  $t$  replaced by the return on the NSE index Nifty and  $\epsilon_i$  is the random error,

So the Abnormal Return is calculated as

$$AR(i,t) = R(i,t) - (\alpha_i + \beta_i R(m,t)) \text{-----(5)}$$

Where  $\alpha$  and  $\beta$  are to be estimated from the estimation periods at  $-220$  to  $-20$  trading days prior to the event window and day  $20$  to  $220$  trading days after the event window.

Event window is a 41 day period around the announcement date (from  $t=-20$  to  $t=20$ ) event window is divided into two sub periods to calculate two sets of AR's i.e., from day  $-20$  to  $0$ , i.e., event day and from day  $1$  to day  $20$  after the merger announcements; using two parameter sets  $(\alpha_1, \beta_1)$  for daily abnormal returns from day  $20$  to day  $-1$  and  $(\alpha_2, \beta_2)$  from day  $1$  to day  $20$ .

To calculate Estimation period, daily data on stock prices and NSE index Nifty values are collected for the period starting 220 trading days prior to the announcement date and 220 trading days after the announcement date. Cumulative Abnormal Return over the event window is calculated by summing up the Abnormal Returns for each day in the event window.

To determine if the abnormal returns are significant, the  $t$  test on the event window for all stock is constructed as follows:

$$T = (CAAR(t_1, t_2) - \mu) / S(CAR(t_1, t_2)) \text{----- (6)}$$

Where  $\mu$  is the Abnormal Return being tested for significance and takes the value of zero. The test statistics for standard error of prediction  $S(CAR(t_1, t_2))$  is calculated by dividing the Average Abnormal Return of all stock over a specified event period  $(t_1, t_2)$  by the standard deviation of the estimation using  $Z$  statistics

$$CAAR = \frac{1}{n} \sum_{i=1}^n CAR(t_1, t_2) \text{-----(7)}$$

$$S(CAR(t_1, t_2)) = \sqrt{\sigma^2 / n} \text{-----(8)}$$

Where  $\sigma^2$  is the estimator of the variance,  $n$  is the number of sample stocks whose excess returns are available at day  $t$ . CAAR is calculated by averaging the CAR data for 16 companies for each day i.e.,  $(-20, -19), (-19, -18) \dots (18, 19), (19, 20)$ .

Similarly Standard Deviation for CAR is calculated for 16 Companies for each day.  $T$ -Test is done for 41 day interval  $(-20, 20)$ , twenty day interval of  $(-20, -1)$  and  $(0, 20)$  days.

The statistics is assumed to follow a standard normal distribution. The study is to analyse whether Merger & Acquisition announcements made by the pharmaceutical companies listed in NSE have significant impact on the company's stock returns. If the impact is significant, the  $t$  statistics is significantly different from zero.

To test the significance, Null hypothesis is that Merger & Acquisition announcements of

pharmaceutical companies have no significant impact on stock returns and the Alternative hypothesis is that the Merger & Acquisition announcements of pharmaceutical companies have a significant impact on stock returns. The level of significance is at 5% the critical value is 2.73.

#### 4. Results and Discussions

The t test statistics for the 16 companies for the event window of 20 days before the merger announcements and 20 days after announcements, CAAR, Standard Deviation, t value are given below.

Table 1- testing of hypothesis

Days	CAAR	Std. Deviat	Std Error	t value	mod t
(-20,-19)	-0.3709	2.675	0.67	-0.55	0.55
(-19,-18)	-0.4156	3.704	0.93	-0.44	0.44
(-18,-17)	1.0686	3.883	0.97	1.10	1.10
(-17,-16)	-0.3389	2.443	0.61	-0.55	0.55
(-16,-15)	-1.4923	2.263	0.57	-2.63	2.63
(-15,-14)	-1.0227	3.714	0.93	-1.10	1.10
(-14,-13)	-0.2181	3.939	0.98	-0.22	0.22
(-13,-12)	-0.5083	3.159	0.79	-0.64	0.64
(-12,-11)	-0.7791	5.179	1.29	-0.60	0.60
(-11,-10)	-0.7440	2.712	0.68	-1.09	1.09
(-10,-9)	-1.2972	4.585	1.15	-1.13	1.13
(-9,-8)	0.0589	4.578	1.14	0.05	0.05
(-8,-7)	1.9015	6.301	1.58	1.20	1.20
(-7,-6)	2.3167	4.398	1.10	2.10	2.10
(-6,-5)	1.7109	5.421	1.36	1.26	1.26
(-5,-4)	-1.1363	6.249	1.56	-0.72	0.72
(-4,-3)	-0.9893	4.213	1.05	-0.93	0.93
(-3,-2)	-1.189	4.655	1.16	-1.02	1.02
(-2,-1)	-1.066	3.691	0.92	-1.15	1.15
(-1,0)	0.7867	4.062	1.02	0.77	0.77
(0,1)	-0.038	4.353	1.09	-0.03	0.03
(1,2)	-1.633	5.065	1.27	-1.28	1.28
(2,3)	-1.543	5.167	1.29	-1.19	1.19
(3,4)	-0.178	2.178	0.54	-0.32	0.32
(4,5)	-0.201	3.418	0.85	-0.23	0.23
(5,6)	-1.3102	4.551	1.14	-1.15	1.15
(6,7)	-1.4245	4.913	1.23	-1.15	1.15
(7,8)	-0.2756	3.918	0.98	-0.28	0.28
(8,9)	-0.834	3.773	0.94	-0.88	0.88
(9,10)	-1.4969	2.439	0.61	-2.45	2.45
(10,11)	-1.1321	2.836	0.71	-1.59	1.59
(11,12)	-0.4215	2.573	0.64	-0.65	0.65
(12,13)	-0.3684	2.483	0.62	-0.59	0.59
(13,14)	0.5091	4.260	1.07	0.47	0.47
(14,15)	1.8793	4.693	1.17	1.60	1.60
(15,16)	0.732	3.610	0.90	0.81	0.81
(16,17)	0.523	3.099	0.77	0.67	0.67
(17,18)	1.105	3.097	0.77	1.42	1.42
(18,19)	-0.16	3.210	0.80	-0.19	0.19
(19,20)	-0.709	1.825	0.46	-1.55	1.55
(-20,20)	-5.1381	14.085	3.52	-1.45	1.46
(-20,-1)	-1.523	10.304	2.58	-0.59	0.59
(0,20)	-3.679	9.284	2.32	-1.58	1.58

\*5% significant level i.e., critical value is 2.73; \*n is 16

The table 1 shows the Cumulative Average Abnormal Return (CAAR) from day -20 to day +20 individually and also CAAR of the event window of 41 days(-20,+20), the CAAR of the event window before the event (-20,-1), the CAAR of event window after the event (0,20) during the whole 21 day event period are calculated.

The results show that the 41 day CAAR (denoted as CAAR (-20, 20)) is -5.1385 which is significantly different from zero. The 20 day CAAR before the announcement (denoted as CAAR (-20,-1)) is -1.5228 and the CAAR after the announcement (0,20) is -3.6784 are not significant.

Using t test, the above table shows that there is no significant impact of merger announcements so accept the null hypothesis.

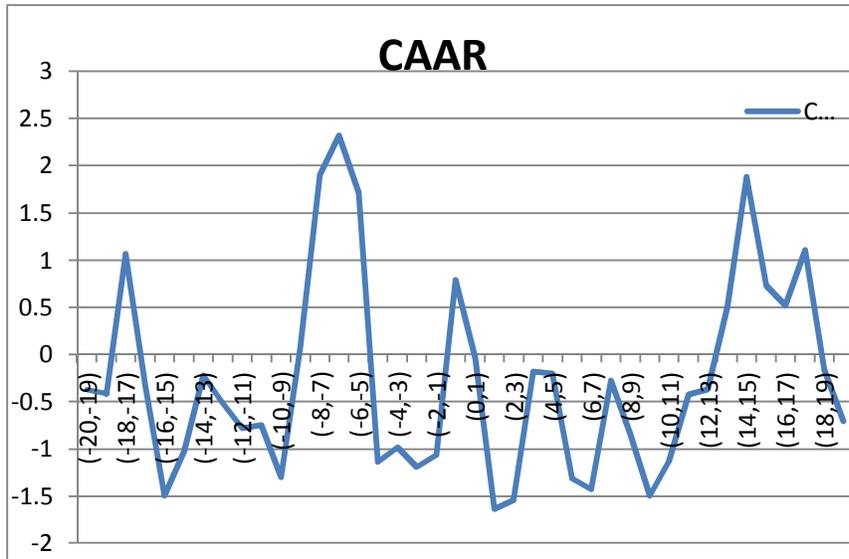


Figure no.1 shows the CAAR during event window

Figure no.1 shows the CAAR over the event window is positive on day (-18,-17), (-9 to -5) are before the merger announcements. The CAAR over the event window is positive on event day and 13 to 18 days after merger announcements.

Table no.2 CAAR of the companies

Companies	CAR		
	before 20day to after 20	before 20 day to 1day	after1 to 20 day
1	-3.482	4.911	-8.23
2	4.437	-1.088	8.283
3	17.072	19.768	-10.70
4	7.7246	11.005	-4.118
5	1.7049	7.1712	-4.306
6	-9.764	3.0265	-9.519
7	-29.491	-13.856	-15.63
8	-12.546	-6.291	-6.88
9	12.2726	6.542	4.905
10	-7.4623	4.721	-12.18
11	-16.970	-16.728	0.864
12	-15.691	-12.741	-2.31
13	-8.8218	-4.088	-5.137
14	16.868	-4.0915	20.472
15	-24.631	-9.929	-14.70
16	-13.433	-12.695	0.366

The CAAR (before 20day to after20) of six individual companies are positive, in which three companies CAAR are above 12. The CAAR of ten companies are negative of which seven companies are above -12 and a company is as high as -29.49.

The CAAR(before 20 day to 1day) of 7 companies are positive, in which 1 company's CAAR is 19.The other companies are less than 11. The CAAR of 9 companies are negative, of which 4 companies are above -12.

The CAAR (after1 to 20 day) of 5 companies are positive, in which a company's CAAR is 20.4.The CAAR of other 11 companies is negative, of which 3 companies are above -12.

### 5. Conclusion

While analyzing the organizations for investing, the investor on hearing a merger announcement should buy the share by analyzing the fundamentals as well as about the target company. The share market may react differently at different period of time. Some studies show a significant impact of the merger announcements on share price behaviour. In some studies there is no significant impact on share price behaviour on merger announcements (Asquithe & Kim, 1982), Narayanan Jayaraman, Mandelkar & shastri (1991). Further study may be done to analyse different sectors and time periods.

### Corresponding Author:

Ms.S.Padmavathy,  
Assistant Professor,  
Department of Management Studies,  
Kongu Engineering College,  
Perundurai,Erode,Tamilnadu,  
India. PIN: 638 052  
Email id: [padmaarasu@gmail.com](mailto:padmaarasu@gmail.com)

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