A Study on "Event -Study Analysis of Semi-Strong form of Capital Market Efficiency"

(With special reference to Bonus Share announcement of Ajanta Pharma Ltd)

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Abstract

Event study can be carried out to see just how rapid security prices actually react to the release of new information. Do the security prices react rapidly or slowly? Are the returns after the announcement date abnormally high or low? Are they simply normal? Whether the market is efficient or inefficient? Are the securities overreacting or under reacting to the new information? Whether the stock markets are in semi-strong form efficient? Whether the event announcement is significant or insignificant? Note that the answer to second question requires a definition of a normal return for a given security. This paper answers to these questions and communicate the same to the users of information.

Key Words: Bonus Shares,Beta, Alpha, Market Model and CAR

1. Introduction

Bonus Shares: A bonus share is a free share of stock given to existing shareholders in a company, based upon the number of shares that the shareholder already owns. the issue of bonus shares does not change the value of the company though it increases the total number of shares issued and owned. Although the total number of issued shares increases, the ratio of number of shares held by each shareholder remains constant.

Market Model: The market model says that the return on a security depends on the return on the market portfolio and the extent of the security's responsiveness as measured by beta. The return also depends on conditions that are unique to the firm. The market model can be graphed as a line fitted to a plot of asset returns against returns on the market portfolio. This relationship is sometimes called the single-index model. The market model, which is used for evaluating the expected return, is mathematically expressed as:

$$ER_{it} = \alpha_i + \beta_i R_{mt} + e_{it}$$

R_{mt} is the market's rate of return at time t (BSE SENSEX). α_i is the average rate of return the stock would realize in a period with a zero market return. This is the estimate of the intercept of a straight line or alpha coefficient of i security. β_i measures the stock sensitivity to the market return which is the slope of a straight line or Beta coefficient of i security. e_{it} is known as residual which is the stock's return over and above what one would predict presumably due to the event in question. The abnormal returns are computed using the following model:

$$AR_{it} = R_{it} - ER_{it}$$

R_{it} = Actual Returns of the i security during time t. β and α of the companies having the announcement were calculated for each event window, by solving the regression equation,

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

Paired-T-test: A paired t-test is used to compare two population means where you have two samples in which observations in one sample can be paired with observations in the other sample. Paired-T-test can use Before-and-after event on the same data. In testing the null hypothesis that the populations mean is equal to a specified value μ_0, one uses the statistic

$$t = \frac{\overline{x} - \mu_0}{s/\sqrt{n}}$$

Where $\overline{x}$ the sample mean, 's' is the standard deviation of the sample and n is the sample size. The degrees of freedom used in this test are $n - 1$. Although the parent population does not need to be normally distributed, the distribution of the population of sample means, $\overline{x}$, is assumed to be normal. The other statistical tools used in the data analysis are explained here under.

Slope or β: Slope is a measure of risk of the security. Greater the β value higher the risk associated with the investments of particular security. The slope of the security 's' is calculated with the following formula.

$$\text{Slope of the security} \Rightarrow \boldsymbol{\beta s} = \frac{COVs,m}{\sigma_m^2}$$

Intercept or α: Alpha is a measure of the so-called active return on an investment, the performance of that investment compared to a suitable market index. An alpha of 1 means the investment's return on investment over a selected period of time was 1% better than the market during that same period, an alpha of -1 means the investment underperformed the market. Alpha is one of the five key measures in modern portfolio theory.

Correlation (r): Correlation is a statistical measure that indicates the extent to which two or more variables fluctuate together. A positive correlation indicates the extent to which those variables increase or decrease in parallel; a negative correlation indicates the extent to which one variable

increases as the other decreases. The formal term for correlation is the *correlation coefficient.* Many different correlation measures have been created; the one used in this case is called the *Pearson correlation coefficient*. The formula for the correlation (*r*) is

$$r = \frac{1}{n-1}\left(\frac{\sum_x \sum_y (x-\bar{x})(y-\bar{y})}{s_x s_y} \right)$$

where *n* is the number of pairs of data; $\bar{x}$ and $\bar{y}$ are the sample means of all the *x*-values and all the *y*-values, respectively; and s_x and s_y are the sample standard deviations of all the *x*- and *y*-values, respectively.

Coefficient of determination (r^2): The square of correlation value of *x* and *y* is termed as coefficient of determination. $r^2 = (Cor_{x,y})^2$

Standard Deviation (S or σ): The standard deviation of all the *x*-values (S_x ***or*** σ_x) and the standard deviation of all the *y*-values (S_y or σ_y). Standard deviation of *x*-values, use the following equation:

$$s_x = \sqrt{\frac{\sum (x-\bar{x})^2}{n-1}}.$$

Variance (σ^2) : The variance measures how far each number in the set is from the mean. Variance is calculated by taking the differences between each number in the set and the mean, squaring the differences (to make them positive) and dividing the sum of the squares by the number of values in the set.

$$\sigma^2 = \frac{\sum (X-\mu)^2}{N}$$

Covariance: A measure of the degree to which returns on two risky assets move in tandem. A positive covariance means that asset returns move together. A negative covariance means returns move inversely.

To test the semi-strong form of capital market efficiency one of the internal corporate announcements bonus shares issue is considered. Collected data is tabulated and used paired T-test to analyze the data. Hypothesis of the study is tested with computed value of T compared with table value. It shows the result, whether event announcement is fully reflecting on security price or not and there by test the evidence of semi-strong form of capital market efficiency.

2. METHODOLOGY

Methodology is the key facet which governs the outcome of the research. It encompasses and directs the researcher to conduct the research in a systematic process which ensures and facilitates the accuracy of the outcomes. The present research study strictly abides by conceptual frame work of research process. All elements in various stages of research process are explained henceforth. Event study methodology, which tries to measure the effect of an event and how quickly these events are reflected in asset prices, is used to analyze the effect of the selected events. The analysis centers on the "Event Window" or test period when evidence of abnormal behavior in market is sought. In this study the event window is 15 days before the event date, event announcement date and 15 days after the event. Thus total event window is 31 days.

NEED FOR THE STUDY

In Indian capital market resource mobilization is mainly from two important stock exchanges namely NSE and BSE. To protect the interest of the investors in the capital market the efficient markets play a vital role. Capital market efficiency has important issues in an investment management community. At stake are Billions of dollars in investment management fees, professional reputations, and some would disagree even the effective functioning of our capital market. The Basic factors necessitating the need for the study is changes in the global financial markets and changing investor's knowledge level towards capital market forms. A number of company's securities now available in capital markets. The income of the investors and their saving habits are also under gone a lot of changes in recent period. The investor's conception levels are also increased rapidly. Once, they used to selected securities only considering on the basis of risk and returns. But now it is not the case. The investors are giving more significance to considering all events and patterns which influences the share price movement in stock market. The technical analysis of event study provides information to the investor to take decisions in their investment patterns. The events influencing the security price may either controlled operations by the business or uncontrolled operations forced by external factors. Internal events influencing the share price are earnings announcement, stock split, dividend announcement, renovation, expansion, diversification, mergers and acquisitions, etc. others are external events such as budget announcement, monetary and fiscal policy, Government policy, inflation, socio-political and economic reforms, etc.

SCOPE OF THE STUDY

The scope of the study is reasonably broader and includes capital market evaluation by considering the internal events such as issue of bonus shares, Dividend announcement, Rights issue, Mergers and Acquisitions in both listed companies of BSE and NSE. The scope of the study is confined to 80

events such as Dividend announcement, issue of bonus shares, Rights issue, Mergers and Acquisitions, influence on daily closing prices of securities. To make the study meaningful, pre-event 15 days, event day and post-event 15 days (thus event window consists of 31 days) of daily closing value of stock by taking S&P BSE SENSEX and S&P CNX NIFTY as the benchmarks. Event-study analysis of semi-strong form of capital market efficiency has been conducted by collecting the secondary information of various events during the period of 2010 April 1st to 2015 March 31st.

Further the scope of the research is vast and can extend by taking other internal events that are not covered. Is the effect of event announcement more on companies with particular type of shareholding pattern or are there any other company-specific factors? Is the effect of event announcement more or less on particular sector(s) i.e., any industry-specific factors? The research in this area can be made more comprehensive and conclusive by conducting more such studies. It can also extended by taking external event-study.

Statement of the Problem

In the economic development of nation Capital market play vital role. Many parties are interested in knowing the efficiency of the capital market. If their securities in the market are appropriately priced, the small and medium investors can be motivated to save and invest in the capital market. The information content of events and its diffusion determine the efficiency of the capital market. That is how quickly and correctly security prices reflect these information show the efficiency of the capital market. Many research studies in the developed countries have been conducted to test the efficiency of the capital market with respect to information content of events. Whereas in developing country like India, very few studies have been conducted to test the efficiency of the capital market with respect to internal event announcements, even after these studies have been conducted with different industries with different periods. Hence present study is an attempt to test the efficiency of the Indian capital market with respect to information content of internal events announcement by listed companies of BSE and NSE during the period (Apr 1, 2010 – Mar 31, 2015).

A market is efficient with respect to a particular set of information, if it is impossible to make abnormal profits (other than by chance) by using this set of information to study the firm's pre and post event. In an efficient market a set of information is fully and immediately reflected in market prices. An event-study analysis considers, what happens in an efficient market when new information is released? And also explains whether the event announcement is significant or insignificant? Are the capital markets semi-strong efficient? To find the answers to the above questions the present study has undertaken by the researcher.

Sampling Plan

The study is based on convenient sampling technique. The researcher has selected the events in various industries based on the occurrence in during period (April 1st 2010 – March 31st 2015). The selected company may have more than one internal event announcements in that period.

Sample Size

The sample size of events taken for the study is 80, of which 60 events from BSE listed companies and other 20 events taken from NSE listed companies. The events chosen for the study are Dividend, Bonus shares, Right issues, Mergers and Acquisitions announcements.

Sample Unit

The sample unit taken for the study is 80 events of BSE & NSE listed companies share prices movement influenced by internal events such as Dividend, Bonus shares, Right issues, Mergers and Acquisitions announcements, has taken as sample unit.

OBJECTIVES OF THE STUDY

Primary Objective

To evaluate the impact of internal events announcement on security prices in Semi-strong form of capital market efficiency.

HYPOTHESES

Primary Hypothesis

H_0: Internal event announcement does not fully reflect the security price.

Secondary Hypothesis

H_{01}: *'Bonus shares announcement'* does not fully reflect the security prices. **DATA SOURCES**

According to the objectives and hypotheses of the study, the researcher is chosen the stocks listed on the BSE and NSE as the field of analysis. The study on efficiency of Indian capital market, particularly on the leading stock exchange of India BSE and NSE attracts the attention of researchers

and analysts in view of recent fluctuations in portfolio investments levels and the global financial confusion.

Primary Data

The data collected for the present study comprises of only secondary source of data. There is no primary data is required.

Secondary Data

In order to fulfill the needs of the study, data is collected from the various secondary sources. The data pertaining to various forms of capital markets and selected security and indices values are collected from the major sources of data being SEBI reports, BSE & NSE reports, company reports and web services such as moneycontrol.com. In addition, secondary data is collected from various magazines, journals, Survey reports and reference books etc.

STATISTICAL TOOLS APPLIED

The data collected through the secondary sources has been analyzed by using T-test, which is used to understand the impact of event announcement in semi-strong form of capital market efficiency by taking share prices movement of pre and post event study.

Paired-T-test: A paired t-test is used to compare two population means where you have two samples in which observations in one sample can be paired with observations in the other sample. Paired-T-test can use Before-and-after event on the same data. In testing the null hypothesis that the populations mean is equal to a specified value μ_0, one uses the statistic

$$t = \frac{\overline{x} - \mu_0}{s/\sqrt{n}}$$

Where $\overline{x}$ the sample mean, 's' is the standard deviation of the sample and n is the sample size. The degrees of freedom used in this test are $n - 1$. Although the parent population does not need to be normally distributed, the distribution of the population of sample means, $\overline{x}$, is assumed to be normal. Paired-T- test is used for the purpose of testing the influence of an event announcement on the firm's share prices by using pre and post event information. On the other hand, the test has been administered to study the influence of particular event on share price movement in semi-strong form of capital market efficiency. The question of whether the excess returns around the announcement date are different from zero is answered by estimating the T value for each event. T statistics is used to compare the returns of the stocks 15 days before and 15 days after the event. In this study the researcher has taken 5 % level of significance. The other simple statistical tools applied for the

analysis of the data are Intercept, Slope, Mean, Variance, Co-variance, Standard deviation, Coefficient of Correlation, Coefficient of Determination, Graphs, etc.

3.Data Analysis

EVENT STUDY ANALYSIS IN BSE LISTED COMPANIES WITH REFERENCE TO *BONUS SHARES ANNOUNCEMENT*AJANTA PHARMA LTD

Table1- Effect of BONUS ANNOUNCEMENT of AJANTA PHARMA on Market Efficiency

DATE	BSE-MARKET RETURN (%)	AJANTA PHARMA ACTUAL RETURN (%)	AJANTA EXP. RETURN (%)	ABNORMAL RETURN (%)	CUMULATIVE ABNORMAL RETURN (%)	TIME (DAY BEFORE & AFTER BONUS ANNOUNCEMENT
4-Jul-13	-	-	-	-	-	-
5-Jul-13	0.44	1.82	0.40	-1.43	-1.43	-15
8-Jul-13	-0.88	-0.40	-1.60	-1.20	-2.63	-14
9-Jul-13	0.59	1.47	0.63	-0.84	-3.47	-13
10-Jul-13	-0.75	2.94	-1.41	-4.35	-7.82	-12
11-Jul-13	1.98	3.22	2.74	-0.48	-8.30	-11
12-Jul-13	1.44	-2.35	1.91	4.26	-4.04	-10
15-Jul-13	0.38	1.97	0.31	-1.66	-5.70	-9
16-Jul-13	-0.91	-1.51	-1.66	-0.15	-5.85	-8
17-Jul-13	0.49	1.69	0.48	-1.21	-7.07	-7
18-Jul-13	0.90	7.95	1.10	-6.85	-13.91	-6
19-Jul-13	0.11	-0.09	-0.11	-0.02	-13.93	-5
22-Jul-13	0.05	0.28	-0.20	-0.48	-14.40	-4
23-Jul-13	0.71	-0.15	0.81	0.96	-13.45	-3
24-Jul-13	-1.04	-2.67	-1.85	0.81	-12.63	-2

25-Jul-13	-1.42	-5.35	-2.43	2.92	-9.71	-1
26-Jul-13	**-0.29**	**-2.74**	-0.70	**2.03**	**-7.68**	**0**
29-Jul-13	-0.78	-2.91	-1.46	1.45	-6.23	1
30-Jul-13	-1.25	-1.02	-2.17	-1.15	-7.38	2
31-Jul-13	-0.01	-4.75	-0.29	4.45	-2.92	3
1-Aug-13	-0.15	-2.40	-0.49	1.91	-1.02	4
2-Aug-13	-0.79	-2.96	-1.48	1.48	0.47	5
5-Aug-13	0.10	-2.51	-0.13	2.39	2.86	6
6-Aug-13	-2.34	-4.55	-3.83	0.72	3.58	7
7-Aug-13	-0.36	8.76	-0.82	-9.58	-6.01	8
8-Aug-13	0.67	-2.77	0.74	3.51	-2.50	9
12-Aug-13	0.84	0.48	1.01	0.52	-1.97	10
13-Aug-13	1.49	1.22	2.00	0.78	-1.19	11
14-Aug-13	0.72	1.09	0.82	-0.27	-1.46	12
16-Aug-13	-3.97	-6.95	-6.31	0.64	-0.82	13
19-Aug-13	-1.56	-1.19	-2.65	-1.45	-2.28	14
20-Aug-13	-0.34	-3.10	-0.78	2.32	0.04	15

SOURCE: Author computations from BSE historical information

The bonus equity shares that Ajanta Pharma ltd had announced were in July 26, 2013 in the ratio of 1:2. The company has fixed Sept 18, 2013 as the Record Date for the purpose of issue of Bonus Equity Shares in the ratio of One (1) new fully paid-up Equity Shares of Rs. 5/- each for every Two (2) fully paid-up shares held. When the market return is Zero, the security return will be 1.52%. Table: 1.1 shows the data of Fifteen days before and after the event (Bonus issue) announcement. It shows when the market return was 0.44%, the security return was 1.82%. It is seen from the above Table that, until the bonus announcement (at time 0) the CAR was -9.71%. After bonus issue was announced, CAR decreased to about -2.03% and has been changed every day during next Fifteen days. Security CAR is in anticipation of the bonus issue at time 0.

Fig. : CAR fluctuations in Ajanta Pharma ltd

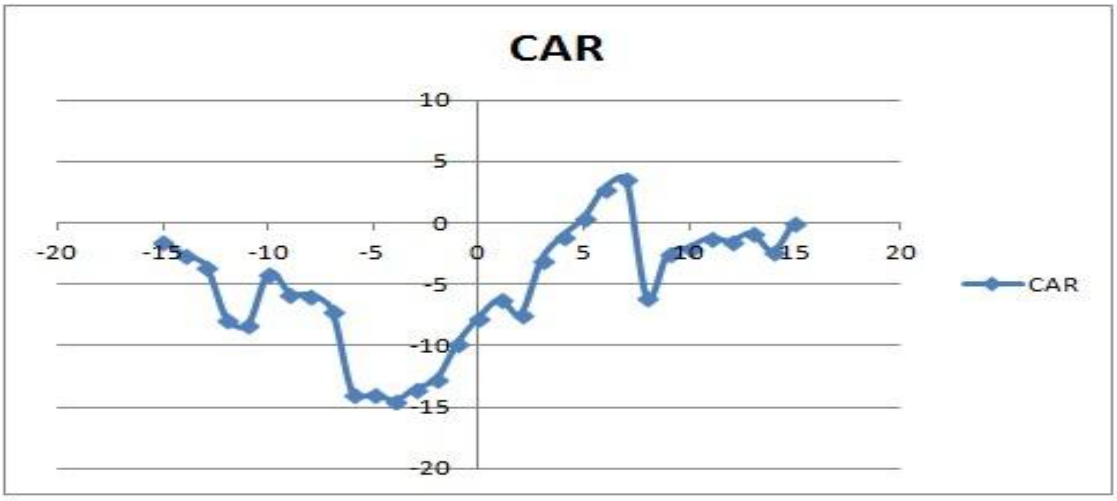

Table: Summaries of Regression Parameters for AJANTA PHARMA vs BSE Returns		
Intercept(α)	-0.27	
Slope(β)	1.5275	
Coefficient of Correlation	0.5316	
R^2	0.2826	
Covariance	2.1251	
	Market	**Security**
Returns	-0.19	-0.56
Variance(σ^2)	1.4376	11.8692
Standard Deviation(σ)	1.199	3.44517

SOURCE: Author computations from BSE historical information

Beta (slope) the above table: 1.2 shows Ajanta pharmacy company ltd has β of 1.52 based on the daily returns during July 4, 2013 to August 20, 2013. A beta of greater than 1 means that Ajanta pharmacy company returns are more volatile than the market (BSE) returns. **Alpha (Intercept)** The intercept is -0.27. Ajanta pharmacy company ltd has negative -0.27% return when market return is Zero. It shows the firm returns are underperformed than market returns. The **Coefficient of Correlation** is 0.53. The positive correlation indicates that when the market return goes up, Ajanta pharmacy company ltd's return also goes up. **Coefficient of determination** (cor^2 or R^2**)** is 0.28. It indicates the percentage of the variance of Ajanta pharmacy company ltd's return explained by the changes in the market returns. Thus, Market explains 28% is Ajanta pharmacy company ltd's risk (the variance of returns). The 72% unexplained variance is the firm-specific variance. **Variance** of the security is a measure of total risk. The variance of Ajanta pharmacy company ltd's returns is -0.56 and the market returns is -0.19. The **Covariance** of the Ajanta pharmacy company ltd returns and market returns is 2.12.

Ajanta pharma company ltd has systematic and unsystematic risks. Systematic risk = cor^2 × security variance, i.e. 0.2826 X 11.8692 = 3.3542; Unsystematic risk = (1-cor^2) × security variance, i.e. (1-0.2826) X 11.8692 = 8.5149; Total risk = security variance, i.e. 3.3542 + 8.5149 = 11.8692.

H_{01}: *'Bonus shares announcement'* does not fully reflect the security prices

Computed Value < Table Value => Accept H_0

4. Finding & Conclusions

Paired T-test analysis shows at 5% significance level, using the table of T-distribution at 28 degree of freedom, the observed value of T is 1.702 which is less than table value (2.048). Thus, we accept

H_0 and conclude that there is no significant difference in returns of the SENSEX and the firm around bonus announcement date. Hence we can infer that bonus announcement does not fully reflect the share price of Ajanta pharmacy company ltd.

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