



## Is Market Efficient in Semi-Strong Form Using Two Factor Model?

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### ABSTRACT

One of the most important criteria being used for testing the market efficiency is to know whether market allows opportunity for the investors to make profit. Since it is difficult to simultaneously test the market efficiency in absolute form, EMH is tested in weak form, semi-strong form and strong form. How the market adjusts the prices with the new information is studied with regard to the company which announced dividend payment during the study period. From the market point of view, it is essential to know how the market reacts to the announcement of dividend payment of Cipla Ltd. The objective of this study is to investigate whether stock prices adjust to announcement of dividend payment information and to examine whether EMH applies to the Indian Stock Market. The study focuses on Cipla Ltd. listed on the Bombay Stock Exchange and uses announcement of dividend payment as an event. The market adjusted model using single and two factors is used to measure the abnormal returns. The stock price behavior is examined through event study methodology. Student't' test is applied for statistical significance. The result based on announcement of dividend payment show that the investors can not earn abnormal returns and market is efficient in semi-strong form.

### KEYWORDS

#### Introduction:

Equity shares are issued on the basis of market conditions. If the market perceives that a company will continue to have good earnings in future, the market price of the company's share will remain at the same level or will go up. On the other hand, if the market doubts about the future earnings capacity of the company, it may place lesser value on its share price. Of course any new investments made for expanding business bear results only after short gestation period, extending sometimes to a few years. The aspects would of course be considered by the market and the price gets normalized over a period of time. How quick the market adjusts the prices with the new information, would reveal the efficiency of the market. Hence, this aspect was studied with regard to the company which announced dividend payment during the study period. From the market point of view, it is essential to know how the market reacts to the announcement of dividend payment of Cipla Ltd.

In efficient market, every investor has equal access to information and therefore, any information that is released to the market should be available to every investor. Based on the information content of the stock prices, Efficient Market Hypothesis (EMH) is investigated in weak, semi-strong and strong form. Lot of research has been taken place in the EMH at the western context. There is a dearth of studies in India. The available literature evidenced in the literature review that even though there are some investigating the market efficiency, there are no robust conclusions on the market efficiency. Therefore, investigation of the market efficiency in the Indian context is an imperative need. This prompts me to undertake the investigation of the market efficiency in the Indian context.

#### Objectives of the study:

1. To study reaction of NSE market to the announcement of dividend payment of Cipla Ltd.; and
2. To test whether stock market reactions reflect the market efficiency in semi-strong form.

#### Data and Research Methodology:

Sources of data:

Information was collected for the study on announcement of

dividend payment of Cipla Ltd. share listed in the NSE Nifty Daily stock price of Cipla Ltd. and NSE Nifty were collected from 31-03-2013 to 10-07-2015. The event of announcement of dividend payment of Cipla Ltd. was identified based on board meeting held on 27-01-2015. Thirty observations of closing market prices of shares before and after the event of announcement of dividend payment were considered. Log returns were used for the purpose of time consistency. Official websites of NSE India.com, money control and Yahoo finance .com were the sources of data collection.

#### Tools of analysis

The data collected for the study was analysed logically and meaningfully to arrive at meaningful conclusions. The statistical tools applied for data analysis were inferential statistic like't'test. Based on objectives, the hypotheses formed for analysis were:

**H<sub>1</sub>:** Null hypothesis states that there is no significant difference between pre-dividend payment announcement and post-dividend payment announcement in earning Abnormal Returns (AR) of Cipla Ltd. share.

**H<sub>2</sub>:** Null hypothesis states that there is no significant difference between pre-dividend payment announcement and post-dividend payment announcement in earning Cumulative Abnormal Returns (CAR) of Cipla Ltd. share.

#### Event Study Methodology:

Announcement of dividend payment is made on a particular day. For the purpose of the analysis, event study methodology proposed by Henderson (1990) is applied. Event day is considered as the day in which a major event happened in a particular company. Under this methodology, an event window is to be framed which consists of certain number of days before the event day and the same number of days after the event day. Studying price movements during the event window would help in assessing the impact. To study the pricing efficiency, the change in the market value of the shares subsequent to announcement of dividend payment has to be assessed. It is known that change in market prices may occur due to change in general economic conditions and industry related conditions, which are referred to as general market factors affecting the prices of all the shares in the market.

Another set of factors is specific company related, which is due to change in the company-related information. Here, specific event of announcement of dividend payment is identified to assess the impact of the on the price of the shares and take the changes in the price over the previous trading day. For the purpose of knowing the changes caused by the particular event, the changes caused by general market-related factors need to be therefore eliminated. The resulting change is referred to as market-adjusted return. In other words, market-adjusted return would reflect the change in the value of shares exclusively due to company-related factors.

The share price index of NSE Nifty is considered for the study to reflect the changes in the general market factors. To exclude market effect on returns, the market return is deducted from actual return, which is termed as market-adjusted return or Abnormal Return (AR). For those event window days, ARs are calculated with the help of selected share prices (i.e. Cipla Ltd.) and market index (NSE Nifty). ARs are calculated for the days on a daily basis.

The standard event study procedure is adopted for the analysis.

**Event Study Date:** The date of the meeting of the board of directors regarding the announcement of dividend payment right issue were denoted as the Event study

**Event Window:** The days surrounding the event study (30 days before and 30 days after the event).

**Estimation period:** 252 days prior to the first day of the event window (-282 to -1 days) was considered.

The log returns for the securities were taken as the core data for the analysis and were calculated as  $R_t = \ln(P_t / P_{t-1}) \times 100$

$R_t$ . indicates the return for the day t,

$P_t$ . implies price in day t and

$P_{t-1}$  denotes the price on the previous trading day.

The NSE Nifty index returns were taken as proxy for the market returns of 252 days during the estimation window and the respective daily share prices of Cipla Ltd. are regressed against the proxy to determine the constant and the regression coefficient to calculate the expected return during the event window (Market Model). The difference between the actual return and the expected return during the event window is considered as abnormal return (AR). The AR is calculated for each day during the event window across the security of Cipla Ltd. for analyzing the ARs around the event. The Cumulative Abnormal Returns (CARs) were also calculated for analyzing the price adjustment process.

The following regression is used

$$R_{jt} = \alpha + \beta R_m \text{ Where}$$

R indicates expected return of a security j on day t

$\alpha_j$  denotes intercept term for security

$\beta_j$  refers to systematic risk component of security j

$R_m$  expresses return on the market portfolio of NSE Nifty in-

dex on day t

$E_{jt}$  implies White noise error term of security j on day t having zero mean and constant variance

AR is calculated as  $R_{jt} - R_{jt}$

$AR_{jt}$  denotes abnormal return of security j at day t

$R_{jt}$  indicates actual return of security j at day t and

$R_{jt}$  refers to Expected return of security j on day t

**Results and Discussion:**

**Single Factor Model:**

It is observed that there is significance of positive change of abnormal returns on the first day and only one during the pre-event period of announcement of dividend payment. No significant change in the abnormal returns during the post-event period of announcement of dividend payment. There is cumulative effect on positive change in abnormal returns throughout the event window period. Positive CAR (Cumulative Abnormal Returns) is because of more of positive change in the abnormal returns than that of negative returns.

**Two-factor Model:**

There are only two positive significant changes in abnormal returns on the pre-event announcement of dividend payment (i.e. -24 and -15 days). Out of them, one is on the first seventh day (i.e. -24 day and another is on the twelfth day (-15 day) of pre-event study period of announcement of dividend payment. Significant change in the positive abnormal returns is witnessed on the first day and the twenty third day after the announcement of dividend payment.

Significant change in the cumulative abnormal returns is evidenced throughout the pre-event study of announcement of dividend payment except first and third (i.e. - 30 and -28 day) days. There is a significant change in CAR on the event day of announcement of dividend payment. Partial response of significant changes in positive CAR for the first a few days and the last a few days after the announcement of dividend payment.

**Conclusion:**

The reaction of stock market to the announcement of dividend payment has concentrated on various aspects. The foreign studies and studies in the Indian context, by and large, documented undervaluation signaling. This study also documented no reaction of stock market to the announcement of dividend payment of Cipla Ltd.

The study finds a statistically insignificant of negative AR of 1.00% and significance of positive CAR of 5.8% on the event day. There was a insignificance of negative and positive Abnormal Returns throughout the entire window period under single factor model. CAR had only positive returns from entire pre-event study period of announcement of dividend payment to 7<sup>th</sup> day of post- event study period.

In the two factor model, there is hardly significance of positive AR during the entire window study period of announcement of dividend payment. Significance of positive CAR had only positive returns from -27<sup>th</sup> day of pre-event study period to 7<sup>th</sup> day of post event study period. It was found that the market signaled not strongly and insignificant. Hence, it does not inspire investors to earn abnormal returns. Hence, market is considered to be efficient in semi-strong form.

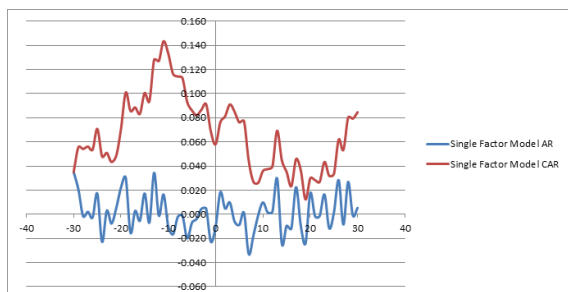
**Table 1: Abnormal and Cumulative Abnormal Log Returns of dividend Payment of Cipla Ltd. Under Single and Two Factor Model**

Single Factor Model							Two Factor Model						
Days	AR	t-stat		CAR	t-stat	Significant	AR	t-stat	Significant	CAR	t-stat	Significant	
-30	0.035	2.041	yes	0.035	2.041	yes	0.007	0.522	no	0.007	0.522	no	
-29	0.021	1.202	no	0.056	3.243	yes	0.033	2.634	yes	0.040	3.156	yes	

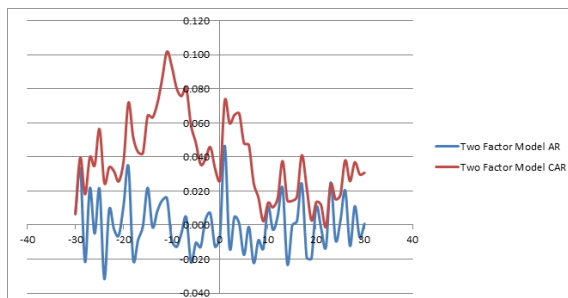
Single Factor Model							Two Factor Model						
Days	AR	t-stat		CAR	t-stat	Significant	AR	t-stat	Significant	CAR	t-stat	Significant	
-28	-0.002	-0.091	no	0.054	3.152	yes	-0.022	-1.714	no	0.018	1.442	no	
-27	0.002	0.121	no	0.056	3.273	yes	0.022	1.732	no	0.040	3.174	yes	
-26	-0.003	-0.153	no	0.054	3.120	yes	-0.005	-0.389	no	0.035	2.785	yes	
-25	0.017	1.005	no	0.071	4.125	yes	0.021	1.695	no	0.056	4.480	yes	
-24	-0.023	-1.329	no	0.048	2.796	yes	-0.032	-2.508	yes	0.025	1.973	yes	
-23	0.003	0.173	no	0.051	2.969	yes	0.009	0.724	no	0.034	2.697	yes	
-22	-0.008	-0.446	no	0.043	2.522	yes	-0.002	-0.180	no	0.032	2.516	yes	
-21	0.005	0.306	no	0.049	2.828	yes	-0.006	-0.475	no	0.026	2.041	yes	
-20	0.022	1.287	no	0.071	4.115	yes	0.012	0.941	no	0.038	2.982	yes	
-19	0.030	1.765	no	0.101	5.879	yes	0.034	2.731	yes	0.072	5.713	yes	
-18	-0.015	-0.885	no	0.086	4.995	yes	-0.020	-1.620	no	0.052	4.093	yes	
-17	0.003	0.167	no	0.089	5.161	yes	-0.009	-0.688	no	0.043	3.405	yes	
-16	-0.005	-0.308	no	0.083	4.853	yes	-0.001	-0.048	no	0.042	3.357	yes	
-15	0.017	1.006	no	0.101	5.859	yes	0.022	1.743	no	0.064	5.101	yes	
-14	-0.007	-0.404	no	0.094	5.455	yes	-0.001	-0.090	no	0.063	5.011	yes	
-13	0.034	2.005	yes	0.128	7.461	yes	0.008	0.657	no	0.071	5.669	yes	
-12	-0.001	-0.062	no	0.127	7.399	yes	0.015	1.154	no	0.086	6.823	yes	
-11	0.016	0.959	no	0.143	8.357	yes	0.016	1.263	no	0.102	8.086	yes	
-10	-0.010	-0.605	no	0.133	7.753	yes	-0.009	-0.683	no	0.093	7.403	yes	
-9	-0.017	-0.972	no	0.116	6.781	yes	-0.013	-1.015	no	0.080	6.388	yes	
-8	-0.002	-0.125	no	0.114	6.657	yes	-0.005	-0.375	no	0.076	6.013	yes	
-7	-0.001	-0.081	no	0.113	6.576	yes	0.005	0.368	no	0.080	6.381	yes	
-6	-0.020	-1.157	no	0.093	5.418	yes	-0.022	-1.720	no	0.059	4.661	yes	
-5	-0.007	-0.406	no	0.086	5.012	yes	-0.010	-0.824	no	0.048	3.837	yes	
-4	-0.004	-0.225	no	0.082	4.788	yes	-0.013	-1.011	no	0.036	2.826	yes	
-3	0.004	0.261	no	0.087	5.048	yes	0.003	0.262	no	0.039	3.088	yes	
-2	0.005	0.265	no	0.091	5.313	yes	0.007	0.551	no	0.046	3.639	yes	
-1	-0.023	-1.327	no	0.068	3.986	yes	-0.013	-1.009	no	0.033	2.631	yes	
0	-0.010	-0.606	no	0.058	3.381	yes	-0.007	-0.528	no	0.026	2.102	yes	
1	0.018	1.070	no	0.076	4.451	yes	0.047	3.699	yes	0.073	5.801	yes	
2	0.005	0.278	no	0.081	4.729	yes	-0.013	-1.046	no	0.060	4.756	yes	
3	0.010	0.574	no	0.091	5.304	yes	0.005	0.378	no	0.065	5.134	yes	
4	-0.006	-0.351	no	0.085	4.953	yes	0.001	0.069	no	0.066	5.203	yes	
5	-0.009	-0.517	no	0.076	4.435	yes	-0.017	-1.384	no	0.048	3.819	yes	
6	0.001	0.062	no	0.077	4.497	yes	-0.001	-0.085	no	0.047	3.734	yes	
7	-0.033	-1.923	no	0.044	2.575	yes	-0.022	-1.760	no	0.025	1.974	yes	
8	-0.017	-1.014	no	0.027	1.560	no	-0.009	-0.700	no	0.016	1.274	no	
9	-0.001	-0.043	no	0.026	1.518	no	-0.014	-1.093	no	0.002	0.181	no	
10	0.010	0.573	no	0.036	2.091	yes	0.011	0.858	no	0.013	1.039	no	
11	0.002	0.092	no	0.037	2.183	yes	-0.003	-0.210	no	0.010	0.829	no	
12	0.002	0.123	no	0.040	2.306	yes	0.005	0.429	no	0.016	1.258	no	
13	0.030	1.729	no	0.069	4.035	yes	0.022	1.729	no	0.038	2.987	yes	
14	-0.025	-1.435	no	0.045	2.599	yes	-0.023	-1.828	no	0.015	1.159	no	
15	-0.009	-0.552	no	0.035	2.047	yes	0.000	-0.024	no	0.014	1.135	no	

Single Factor Model							Two Factor Model						
Days	AR	t-stat		CAR	t-stat	Significant	AR	t-stat	Significant	CAR	t-stat	Significant	
16	-0.012	-0.690	no	0.023	1.357	no	0.002	0.195	no	0.017	1.330	no	
17	0.022	1.309	no	0.046	2.666	yes	0.024	1.928	no	0.041	3.258	yes	
18	-0.009	-0.547	no	0.036	2.119	yes	-0.019	-1.489	no	0.022	1.769	no	
19	-0.024	-1.402	no	0.012	0.717	no	-0.019	-1.546	no	0.003	0.223	no	
20	0.018	1.022	no	0.030	1.740	no	0.011	0.847	no	0.013	1.070	no	
21	-0.002	-0.089	no	0.028	1.651	no	-0.002	-0.138	no	0.012	0.932	no	
22	-0.001	-0.079	no	0.027	1.572	no	-0.013	-1.015	no	-0.001	-0.083	no	
23	0.016	0.955	no	0.043	2.527	yes	0.025	1.988	yes	0.024	1.905	no	
24	-0.012	-0.671	no	0.032	1.856	no	-0.009	-0.701	no	0.015	1.204	no	
25	0.002	0.094	no	0.033	1.950	no	0.002	0.197	no	0.018	1.401	no	
26	0.028	1.651	no	0.062	3.601	yes	0.020	1.620	no	0.038	3.021	yes	
27	-0.008	-0.493	no	0.053	3.107	yes	-0.012	-0.968	no	0.026	2.052	yes	
28	0.027	1.566	no	0.080	4.673	yes	0.011	0.883	no	0.037	2.936	yes	
29	-0.001	-0.056	no	0.079	4.617	yes	-0.007	-0.559	no	0.030	2.376	yes	
30	0.005	0.311	no	0.085	4.928	yes	0.001	0.065	no	0.031	2.441	yes	

**Chart 1: Abnormal and Cumulative Abnormal Returns of Single Factor Mode**



**Chart 2: Abnormal and Cumulative Abnormal Returns of Two Factor Model**



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