

An Analytical Study of Volatility of Stock Price to Establish the Efficiency of Stock Market

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Abstract: Buy-backs of shares have impact on the stock prices, as it is demonstrated by several events in the history. This research is an attempt to validate the 'Semi-strong form' of market efficiency using Event analysis. The event considered in this paper is 'The announcement of Buy-back of shares' from January 2013 to December 2018. This event is tested for possibility of abnormal profits due to possibility non interpretation and non-reflection of news, in the stock prices. The data considered here is free from confounding events (highly turbulent period of -7 and +7 days from the event), -21 to +21 days' window is considered for 'Event Analysis', since the period is enough for the system to adjust the noise (White Noise) created by this news. The results are calculated using paired t-test shows that the event hardly causes any impact on returns annulling the possibility of earning supernormal profits defining Semi-strong form of market efficiency.

Keywords: Event Analysis, Market Efficiency, Semi-Strong Form

JEL Classification: G14, G34

Introduction

Market efficiency is an approach which is synonymous to intrinsic valuation. The chemistry between the market value and intrinsic value aids the investor to earn the profits. Presumably if the markets are efficient it does not always implicate the equality between market value and intrinsic value. All that it suggests is that the errors in the market price are unbiased. This phenomenon indicates that variation in the market and intrinsic value are not planned they are random in nature and hence it becomes very difficult to identify them. So, to identify any overvalues and undervalued security investor has to rely on the historical data and the information spread out in the market. Fama (1970) has recognized three forms of market efficiency explicitly: the weak, semi-strong and strong. Weak form of market efficiency is based on the assumption that current stock prices fully reflect all the past information. On this premise it would be an abortive effort to forecast prices based on historical prices as the prices follow random walk process. Semi-strong form illustrates the concept of efficiency in more details and describes that current stock prices replicate all the publicly available information. Prices reacts to such information very quickly and hence the possibility of earning hence it is difficult to earn super normal profit for

any investor. The strong form is a situation wherein every minute detail regarding the scrip in the purview of public and private domain both is reflected in the stock market price. The efficient market hypothesis does not itself imply that market has perfect forecasting abilities; it merely implies the prices impound all the available information. In Indian market it is assumed that prices of the security reflect the information found in the record of past prices of the security or volumes of trade of security or the open interest build around the security. The market efficiency in semi-strong form suggests that no investor is able to earn abnormal profit due to publicly available information. With the help of event studies, it is measurable as to what is the reaction time of the scrips to any news circulated in the market. The objective of the paper is to observe the stock price (returns) reaction to the buy backs of these companies and thereby validate the form of efficiency in Indian Stock Market.

Study of Existing Review Literature

Sl. no	Authors	Year of the study	Findings
1	Fama and Peterson	1971	An increase in price of stock following an event can occur because of a bonus issue which may have a beneficial content.
2	Basu	1977	This study proposed that P/E ratios have considerable forecasting power. The study emphasized that high P/E firms underperformed & low P/E firms over performed.
3	Foster & Vickrey	1978	In this study the signalling hypothesis using daily return data and information content of 82 stock dividend announcement was done. It was found that there is a considerable positive abnormal return around the announcement date.
4	Reinganum	1981	This study proposed that P/E effect is related to the size of the firm. Even though small firms are likely to be exposed to greater operational risks, small firms tend to outperform large firms.
5.	Woolridge	1983	The study was an observation that positive average abnormal ex-date return of 0.98 % percent for a sample of 317 stocks dividend and proposed that the ex-date effect could arise from market flaws such as taxes and odd- lot transaction costs.
6	Grinblatt	1984	The study considered the 1967 to 1976 ex-dates of stock dividends distributed and found average abnormal returns of 1.1 returns.
7	Eades et al.	1984	The study signified that there is a significant positive ex-date return by the companies listed on New- York Stock Exchange during the study period between 1962 to 1980 for a sample of 2110 stock dividends and stock split.
8	Ramchandran	1985	This study aims at finding out the impact of bonus issue announcement on Indian equity stock prices. The helped to find out a varied evidence of semi- strong form efficiency in the Indian stock market.

9	Lakonishok & Vermalen	1986	The study signified a substantial positive abnormal return for a sample of 2558 stock dividend and stock splits.
10	McNichols & Dravid	1990	The study found out a positive relationship between bonus issue announcement and related abnormal return.
11	Obaidullah	1992	This study accounted a positive stock market reaction to bonus issue announcement and supported the semi-strong form of market efficiency.
12	Srinivasan	1993	This study established enormously large positive abnormal returns on ex- bonus and ex- rights dates for announcements.
13	Rao	1994	This study suggested that the Indian equity market responds in an expected direction to firm announcement and supported the semi-strong form of efficient market in India. The study projected a cumulative abnormal return of 6.3% around three days of bonus issue announcement.
14	Masse et al.	1997	The study was carried on US market (NASDAQ and NYSE respectively) on rights issues and volatility in the market. Kothare finds that there is no change in volatility in the stock price after rights issue announcement whereas, Bae and Jo find decreasing volatility following rights issues.
15	Tsangarakis (1996) for Greece market, Bohren et al. (1997) for Norway market, and Kang and Stulz (1996) for Japanese market	1996	These studies on right issues have accounted positive announcement.
16	Kothare (1997) & Bae & Jo (1999)	1999	This study was carried on US market (NASDAQ & NYSE respectively) on rights issue and volatility of the market. Kothare finds that there is no change in volatility in stock prices after rights issue announcement whereas, Bae and Jo find decreasing volatility in rights issue.
17	Bohren et al. & Hansson	1999	In same framework some researcher argues that there is a small increase in the number of shareholders following rights issue for Norwegian and Finnish stock market.
18	Burton et al. (2000), Suzuki et al (2000) for UK; Singh (1997) for US; Marsden (2000) for New Zealand; Kabir and Roosenboom (2003) for Netherland.	2003	These studies on right issues have accounted negative announcement period return.

19	Mishra	2005	It was found in this study that there is a significant positive abnormal return for a five- day period prior to bonus announcements.
20	Kaustubh Kanti Roy	2011	The paper examined the announcement effects of bonus issues and stock splits on the Indian stock market.

Statement of Problem

The information about the companies like dividend declaration or past prices, bonus, buyback or splits, are used extensively used in valuing the securities, so as to know the correct intrinsic value of the security. That is how quickly and correctly the security prices sreflect this information shows the efficiency of the capital market. If the prices of the security are found very adjustable on the basis of the available information the market is said to be highly efficient. As Indian capital market are supposed to be semi-strong in its nature as it suggests that prices of the securities reflects all information found in the records of past prices of the securities. This study attempts to test the efficiency of the Indian capital market with respect to the information available regarding the buybacks of different companies.

Research Gap

Many studies have raised concern over the efficient market hypothesis, but most of them were focussed on the New York Stock Exchange, and London Stock Market but a very few concerns were raised to check efficiency of Indian Stock Market. The present study tries to examine market efficiency of an emerging stock market like India. The maximum attempts which were made, were made in the form of ‘Event Analysis’ and hence researcher has adopted the same for the reason that the technique is validated in several studies. This paper is an attempt to study the efficiency of Indian stock market by taking into consideration, the companies which have announced Buy-back through the method of Event Analysis.

Research Design

The research methodology adopted in this paper in ‘Event analysis’ methodology, wherein the window of 42 days is considered for companies considered as sample. The duration considered for study is of 5 years (1st January 2013-31st December 2018) I, e 5 financial years. The companies considered for studies are taken from companies included in Sensex.

A) Sampling Universe

Indian stock market has started working from 1875, since then there are several companies have announced Buy-backs. For this study researcher have considered the companies which have announced Buy-backs from time to time.

B) Sample Design

In all there were companies who have announced their Buy-backs in last 5 years. The data considered for the study is quite contemporary as it will give a clearer picture about efficiency of market.

C) Research Methodology

As mentioned above the methodology adopted in this paper is 'Event Analysis'. For doing this analysis a window of 42 days is considered. The rationale behind considering 42 days is to calculate returns of -21 and +21 days from the event happening. The window of 21 days is considered, so as to check the turbulence of -7 and +7 days from the date of event happening.

D) Data Sources

- http://www.bseindia.com/indices/IndicesWatch_Scrip.aspx?iname=BSE30&sensid=30&type=SENS&graphpath=/sensexview/charts/graf_appSENSEX.gif
- www.moneycontrol.com
- Prowess Database
- <https://www.sebi.gov.in/sebiweb/home/HomeAction.do?doListing=yes&sid=3&ssid=22&smid=17>

E) Research Tools

- Microsoft Excel-2013 - For calculation of returns.
- SPSS package (IBM-20 version) - Paired T test.

F) Objective

- To study the impact of news of Buy-backs of companies on the returns of the same companies.
- To validate the form of efficiency in the Indian Stock Market.

G) Hypothesis

H_0 = The returns of the companies before and after announcement of Buy-backs are significantly similar.

H_1 = There is a significant difference in the returns of the companies before and after announcement of Buy-backs.

Data Collection

Sebi website provides the information of around 417 companies which have announced Buy-backs from Dec 2008 till January 2019. Researcher has included 158 companies in sample as data was considered for last 5 years (January 2013 till December 2018). These are the companies who have announce their offers through stock exchanges. Researcher has tried to include more contemporary data so research outcomes can be viewed in the context of current on goings in the market. Returns for these companies are calculated for -21 and +21 days and then analysed with the help of paired t test.

Data Analysis

Paired Samples Test									
Mean		Paired Differences					t	Df	Sig. (2-tailed)
		Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1	Selan Selan 1	0.02056	0.07162	0.01563	-0.01204	0.05316	1.315	157	0.203
Pair 2	Mcleod Mcleod1	-0.0291	0.0993	0.02167	-0.07431	0.0161	-1.343	157	0.194
Pair 3	Goldiam Goldiam 1	-0.00977	0.08605	0.01878	-0.04894	0.0294	-0.52	157	0.609
Pair 4	Oriental Oriental1	-0.0044	0.092	0.02008	-0.04628	0.03748	-0.219	157	0.829
Pair 5	Natco Natco	0.00158	0.04713	0.01028	-0.01987	0.02303	0.153	157	0.88
Pair 6	DCM DCM1	0.02059	0.0665	0.01451	-0.00968	0.05086	1.419	157	0.171
Pair 7	Lakshmi Lakshmi 1	0.00467	0.04015	0.00876	-0.01361	0.02295	0.533	157	0.6
Pair 8	Thyrocare Thyrocare 1	0.00703	0.03552	0.00775	-0.00914	0.0232	0.907	157	0.375

Pair 9	TD TD 1	-0.00072	0.01593	0.00348	-0.00797	0.00654	-0.206	157	0.839
Pair 10	ADF ADF 1	-0.0009	0.0439	0.00958	-0.02088	0.01908	-0.094	157	0.926
Pair 11	ICRA ICRA 1	-0.00289	0.0221	0.00482	-0.01295	0.00717	-0.599	157	0.556
Pair 12	Thyrocare Thyrocare 1	0.00307	0.02808	0.00613	-0.00971	0.01585	0.501	157	0.622
Pair 13	Indiabulls Indiabulls 1	0.00385	0.037	0.00807	-0.01299	0.02069	0.477	157	0.639
Pair 14	Music Music 1	-0.0012	0.03892	0.00849	-0.01892	0.01651	-0.142	157	0.889
Pair 16	ADF ADF 2	0.00826	0.01292	0.00282	0.00238	0.01415	2.929	157	0.008
Pair 17	ADF ADF 2	0.12344	5.69163	1.24201	-2.46736	2.71424	0.099	157	0.922
Pair 18	BSE BSE 2	0.30667	2.22493	0.48552	-0.7061	1.31945	0.632	157	0.535
Pair 19	Sreeleathers Sreeleathers 2	-2.66128	6.70612	1.46339	-5.71387	0.39131	-1.819	157	0.084
Pair 20	DCM DCM 2	0.94348	3.12141	0.68115	-0.47736	2.36433	1.385	157	0.181
Pair 21	Sreeleathers Sreeleathers 2	0.48287	5.2403	1.14353	-1.90249	2.86822	0.422	157	0.677
Pair 22	Mcleod Mcleod 2	-1.03476	8.24997	1.80029	-4.7901	2.72058	-0.575	157	0.572
Pair 23	Indiabulls Indiabulls 2	-1.08378	4.49191	0.98022	-3.12847	0.96091	-1.106	157	0.282
Pair 24	VRL VRL 2	0.39313	3.66806	0.80044	-1.27655	2.06281	0.491	157	0.629
Pair 25	BSE BSE 2	-0.63259	3.30693	0.72163	-2.13789	0.87271	-0.877	157	0.391
Pair 26	Sreeleathers Sreeleathers 3	0.25758	1.83224	0.39983	-0.57645	1.09161	0.644	157	0.527
Pair 27	VRL VRL 3	-1.03129	3.45882	0.75478	-2.60572	0.54315	-1.366	157	0.187
Pair 28	Just Just 3	0.70851	2.58453	0.56399	-0.46796	1.88497	1.256	157	0.224

Pair 29	GHCL GHCL 3	0.12652	3.11268	0.67924	-1.29035	1.5434	0.186	157	0.854
Pair 30	The The 3	-0.22521	1.98206	0.43252	-1.12743	0.67702	-0.521	157	0.608
Pair 31	Gujarat Gujarat 3	-0.21972	5.98314	1.30563	-2.94322	2.50377	-0.168	157	0.868
Pair 32	Indiabulls Indiabulls 3	0.12652	3.11268	0.67924	-1.29035	1.5434	0.186	157	0.854
Pair 33	ICRA ICRA 3	0.00826	0.01292	0.00282	0.00238	0.01415	2.929	157	0.008
Pair 34	The The 3	0.12344	5.69163	1.24201	-2.46736	2.71424	0.099	157	0.922
Pair 35	Fineotex Fineotex 3	0.30667	2.22493	0.48552	-0.7061	1.31945	0.632	157	0.535
Pair 36	Ambika Ambika 4	-2.66128	6.70612	1.46339	-5.71387	0.39131	-1.819	157	0.084
Pair 37	Transpek Transpek 4	0.94348	3.12141	0.68115	-0.47736	2.36433	1.385	157	0.181
Pair 38	Indiabulls Indiabulls 4	0.48287	5.2403	1.14353	-1.90249	2.86822	0.422	157	0.677
Pair 39	Fineotex Fineotex 4	-1.03476	8.24997	1.80029	-4.7901	2.72058	-0.575	157	0.572
Pair 40	Ambika Ambika 4	-1.08378	4.49191	0.98022	-3.12847	0.96091	-1.106	157	0.282
Pair 41	Coal Coal 4	0.02059	0.0665	0.01451	-0.00968	0.05086	1.419	157	0.171
Pair 42	MOIL MOIL 4	0.00467	0.04015	0.00876	-0.01361	0.02295	0.533	157	0.6
Pair 43	Transpek Transpek 4	0.00703	0.03552	0.00775	-0.00914	0.0232	0.907	157	0.375
Pair 44	ADF ADF 4	-0.00072	0.01593	0.00348	-0.00797	0.00654	-0.206	157	0.839
Pair 45	ECE ECE 4	-0.0009	0.0439	0.00958	-0.02088	0.01908	-0.094	157	0.926
Pair 46	Dr Dr 5	-0.00289	0.0221	0.00482	-0.01295	0.00717	-0.599	157	0.556
Pair 47	OnMobile OnMobile 5	0.00307	0.02808	0.00613	-0.00971	0.01585	0.501	157	0.622
Pair 48	Excel Excel 5	0.00385	0.037	0.00807	-0.01299	0.02069	0.477	157	0.639

Pair 49	Excel Excel 5	0.25758	1.83224	0.39983	-0.57645	1.09161	0.644	157	0.527
Pair 50	Tips Tips 5	-1.03129	3.45882	0.75478	-2.60572	0.54315	-1.366	157	0.187
Pair 51	Dr Dr 5	0.70851	2.58453	0.56399	-0.46796	1.88497	1.256	157	0.224
Pair 52	Excel Excel 5	0.12652	3.11268	0.67924	-1.29035	1.5434	0.186	157	0.854
Pair 53	ECE ECE 5	0.00826	0.01292	0.00282	0.00238	0.01415	2.929	157	0.008
Pair 54	Excel Excel 5	0.12344	5.69163	1.24201	-2.46736	2.71424	0.099	157	0.922
Pair 55	OnMobile OnMobile 5	0.30667	2.22493	0.48552	-0.7061	1.31945	0.632	157	0.535
Pair 56	Gujarat Gujarat 6	-2.66128	6.70612	1.46339	-5.71387	0.39131	-1.819	157	0.084
Pair 57	Gujarat Gujarat 6	0.94348	3.12141	0.68115	-0.47736	2.36433	1.385	157	0.181
Pair 58	Tips Tips 6	0.48287	5.2403	1.14353	-1.90249	2.86822	0.422	157	0.677
Pair 59	Infinite Infinite 6	-1.03476	8.24997	1.80029	-4.7901	2.72058	-0.575	157	0.572
Pair 60	CRISIL CRISIL 6	-1.08378	4.49191	0.98022	-3.12847	0.96091	-1.106	157	0.282
Pair 61	CRISIL CRISIL 6	0.00385	0.037	0.00807	-0.01299	0.02069	0.477	157	0.639
Pair 62	R R 6	0.25758	1.83224	0.39983	-0.57645	1.09161	0.644	157	0.527
Pair 63	Onmobile Onmobile 6	-1.03129	3.45882	0.75478	-2.60572	0.54315	-1.366	157	0.187
Pair 64	R R 6	0.70851	2.58453	0.56399	-0.46796	1.88497	1.256	157	0.224
Pair 65	OnMobile OnMobile 6	0.12652	3.11268	0.67924	-1.29035	1.5434	0.186	157	0.854
Pair 66	Edelwiss Edelwiss 7	-1.08378	4.49191	0.98022	-3.12847	0.96091	-1.106	157	0.082
Pair 67	Supreme Supreme 7	0.39313	3.66806	0.80044	-1.27655	2.06281	0.491	157	0.629
Pair 68	Avantel Avantel 7	-0.63259	3.30693	0.72163	-2.13789	0.87271	-0.877	157	0.391

Pair 69	DCM DCM 7	0.25758	1.83224	0.39983	-0.57645	1.09161	0.644	157	0.527
Pair 70	Avantel Avantel 7	-1.03476	8.24997	1.80029	-4.7901	2.72058	-0.575	157	0.172
Pair 71	Cairn Cairn 7	-1.08378	4.49191	0.98022	-3.12847	0.96091	-1.106	157	0.382
Pair 72	Gujarat Gujarat 7	0.39313	3.66806	0.80044	-1.27655	2.06281	0.491	157	0.629
Pair 73	S S 7	-0.63259	3.30693	0.72163	-2.13789	0.87271	-0.877	157	0.491
Pair 74	Motilal Motilal 7	0.25758	1.83224	0.39983	-0.57645	1.09161	0.644	157	0.527
Pair 75	Pennar Pennar 7	-1.03129	3.45882	0.75478	-2.60572	0.54315	-1.366	157	0.187
Pair 76	Infinite Infinite 8	0.70851	2.58453	0.56399	-0.46796	1.88497	1.256	157	0.224
Pair 77	Indo Indo 8	-0.00977	0.08605	0.01878	-0.04894	0.0294	-0.52	157	0.609
Pair 78	Supreme Supreme 8	-0.0044	0.092	0.02008	-0.04628	0.03748	-0.219	157	0.829
Pair 79	Edelweiss Edelweiss 8	0.00158	0.04713	0.01028	-0.01987	0.02303	0.153	157	0.88
Pair 80	Supreme Supreme 8	0.02059	0.0665	0.01451	-0.00968	0.05086	1.419	157	0.171
Pair 81	Garware Garware 8	0.00467	0.04015	0.00876	-0.01361	0.02295	0.533	157	0.6
Pair 82	Maharashtra Maharashtra 8	0.00703	0.03552	0.00775	-0.00914	0.0232	0.907	157	0.375
Pair 83	Mastek Mastek 8	-0.00072	0.01593	0.00348	-0.00797	0.00654	-0.206	157	0.839
Pair 84	Shree Shree 8	-0.0009	0.0439	0.00958	-0.02088	0.01908	-0.094	157	0.926
Pair 85	DCM DCM 8	-0.00289	0.0221	0.00482	-0.01295	0.00717	-0.599	157	0.556
Pair 86	Indo Indo 9	0.00307	0.02808	0.00613	-0.00971	0.01585	0.501	157	0.622
Pair 87	Nitin Nitin 9	0.00385	0.037	0.00807	-0.01299	0.02069	0.477	157	0.639
Pair 88	eClerx eClerx 9	0.39313	3.66806	0.80044	-1.27655	2.06281	0.491	157	0.629

Pair 89	Alliance Alliance 9	-0.63259	3.30693	0.72163	-2.13789	0.87271	-0.877	157	0.391
Pair 90	DCM DCM 9	0.25758	1.83224	0.39983	-0.57645	1.09161	0.644	157	0.527
Pair 91	Mastek Mastek 9	-1.03129	3.45882	0.75478	-2.60572	0.54315	-1.366	157	0.187
Pair 92	Jindal Jindal 9	0.70851	2.58453	0.56399	-0.46796	1.88497	1.256	157	0.224
Pair 93	Panama Panama 9	0.12652	3.11268	0.67924	-1.29035	1.5434	0.186	157	0.854
Pair 94	KRBL KRBL 9	0.00158	0.04713	0.01028	-0.01987	0.02303	0.153	157	0.88
Pair 95	UPL UPL 9	0.02059	0.0665	0.01451	-0.00968	0.05086	1.419	157	0.171
Pair 96	Gujarat Gujarat 1	0.00467	0.04015	0.00876	-0.01361	0.02295	0.533	157	0.6
Pair 97	Aptech Aptech 1	0.00703	0.03552	0.00775	-0.00914	0.0232	0.907	157	0.375
Pair 98	Isgec Isgec 1	-0.00072	0.01593	0.00348	-0.00797	0.00654	-0.206	157	0.839
Pair 99	Cairn Cairn 1	-0.0009	0.0439	0.00958	-0.02088	0.01908	-0.094	157	0.926
Pair 100	Crompton Crompton 1	-0.00289	0.0221	0.00482	-0.01295	0.00717	-0.599	157	0.556
Pair 101	Cairn Cairn 1	-0.00977	0.08605	0.01878	-0.04894	0.0294	-0.52	157	0.609
Pair 102	UPL UPL 1	-0.0044	0.092	0.02008	-0.04628	0.03748	-0.219	157	0.829
Pair 103	UPL UPL 1	0.00158	0.04713	0.01028	-0.01987	0.02303	0.153	157	0.88
Pair 104	Gradiente Gradiente 1	0.02059	0.0665	0.01451	-0.00968	0.05086	1.419	157	0.171
Pair 105	United United 1	0.00467	0.04015	0.00876	-0.01361	0.02295	0.533	157	0.6
Pair 106	The The 1	0.00703	0.03552	0.00775	-0.00914	0.0232	0.907	157	0.375
Pair 107	Crompton Crompton 1	-0.00072	0.01593	0.00348	-0.00797	0.00654	-0.206	157	0.839
Pair 108	Alliance Alliance 1	-0.0009	0.0439	0.00958	-0.02088	0.01908	-0.094	157	0.926

Pair 109	Zen Zen 1	-0.00289	0.0221	0.00482	-0.01295	0.00717	-0.599	157	0.556
Pair 110	Nitin Nitin 1	0.00307	0.02808	0.00613	-0.00971	0.01585	0.501	157	0.622
Pair 111	Garware Garware 1	0.00385	0.037	0.00807	-0.01299	0.02069	0.477	157	0.639
Pair 112	JBF JBF 1	-1.03476	8.24997	1.80029	-4.7901	2.72058	-0.575	157	0.572
Pair 113	Nitin Nitin 1	-1.08378	4.49191	0.98022	-3.12847	0.96091	-1.106	157	0.282
Pair 114	Jindal Jindal 1	0.39313	3.66806	0.80044	-1.27655	2.06281	0.491	157	0.629
Pair 115	Nitin Nitin 1	-0.63259	3.30693	0.72163	-2.13789	0.87271	-0.877	157	0.391
Pair 116	JBF JBF 1	0.25758	1.83224	0.39983	-0.57645	1.09161	0.644	157	0.527
Pair 117	JBF JBF 1	-1.03129	3.45882	0.75478	-2.60572	0.54315	-1.366	157	0.187
Pair 118	eClerx eClerx 1	0.70851	2.58453	0.56399	-0.46796	1.88497	1.256	157	0.224
Pair 119	Nitin Nitin 1	0.12652	3.11268	0.67924	-1.29035	1.5434	0.186	157	0.854
Pair 120	SMS SMS 1	0.00158	0.04713	0.01028	-0.01987	0.02303	0.153	157	0.88
Pair 121	The The 1	0.02059	0.0665	0.01451	-0.00968	0.05086	1.419	157	0.171
Pair 122	FDC FDC 1	0.00467	0.04015	0.00876	-0.01361	0.02295	0.533	157	0.6
Pair 123	eClerx eClerx 1	0.00703	0.03552	0.00775	-0.00914	0.0232	0.907	157	0.375
Pair 124	The The 1	-0.00072	0.01593	0.00348	-0.00797	0.00654	-0.206	157	0.839
Pair 125	The The 1	-0.0009	0.0439	0.00958	-0.02088	0.01908	-0.094	157	0.926
Pair 126	Aptech Aptech 1	-0.00289	0.0221	0.00482	-0.01295	0.00717	-0.599	157	0.556
Pair 127	Crompton Crompton 1	-0.0044	0.092	0.02008	-0.04628	0.03748	-0.219	157	0.829
Pair 128	Aptech Aptech 1	0.00158	0.04713	0.01028	-0.01987	0.02303	0.153	157	0.88

Pair 129	Crompton Crompton 1	0.02059	0.0665	0.01451	-0.00968	0.05086	1.419	157	0.171
Pair 130	Motilal Motilal 1	0.00467	0.04015	0.00876	-0.01361	0.02295	0.533	157	0.6
Pair 131	S S 1	0.00703	0.03552	0.00775	-0.00914	0.0232	0.907	157	0.375
Pair 132	Infinite Infinite 1	-0.00072	0.01593	0.00348	-0.00797	0.00654	-0.206	157	0.839
Pair 133	Pennar Pennar 1	-0.0009	0.0439	0.00958	-0.02088	0.01908	-0.094	157	0.926
Pair 134	Infinite Infinite 1	-0.00289	0.0221	0.00482	-0.01295	0.00717	-0.599	157	0.556
Pair 135	Avantel Avantel 1	0.00307	0.02808	0.00613	-0.00971	0.01585	0.501	157	0.622
Pair 136	LKP LKP 1	0.00385	0.037	0.00807	-0.01299	0.02069	0.477	157	0.639
Pair 137	HT HT 1	0.02059	0.0665	0.01451	-0.00968	0.05086	1.419	157	0.171
Pair 138	Vardhman Vardhman 1	0.00467	0.04015	0.00876	-0.01361	0.02295	0.533	157	0.6
Pair 139	Avantel Avantel 1	0.00703	0.03552	0.00775	-0.00914	0.0232	0.907	157	0.375
Pair 140	Maharashtra Maharashtra 1	-0.00072	0.01593	0.00348	-0.00797	0.00654	-0.206	157	0.839
Pair 141	SMS SMS 1	-0.0009	0.0439	0.00958	-0.02088	0.01908	-0.094	157	0.926
Pair 142	Maharashtra Maharashtra 1	-0.00289	0.0221	0.00482	-0.01295	0.00717	-0.599	157	0.556
Pair 143	Zen Zen 1	0.00158	0.04713	0.01028	-0.01987	0.02303	0.153	157	0.88
Pair 144	Sasken Sasken 1	0.02059	0.0665	0.01451	-0.00968	0.05086	1.419	157	0.171
Pair 145	Zee Zee 1	0.00467	0.04015	0.00876	-0.01361	0.02295	0.533	157	0.6
Pair 146	ECE ECE 1	0.00703	0.03552	0.00775	-0.00914	0.0232	0.907	157	0.375
Pair 147	Rain Rain 1	-0.00072	0.01593	0.00348	-0.00797	0.00654	-0.206	157	0.839

Pair 148	Shri Shri 1	-0.0009	0.0439	0.00958	-0.02088	0.01908	-0.094	157	0.926
Pair 149	Tips Tips 1	-0.00289	0.0221	0.00482	-0.01295	0.00717	-0.599	157	0.556
Pair 150	Panama Panama 1	0.02059	0.0665	0.01451	-0.00968	0.05086	1.419	157	0.171
Pair 151	Kanoria Kanoria 1	0.00467	0.04015	0.00876	-0.01361	0.02295	0.533	157	0.6
Pair 152	KRBL KRBL 1	0.00703	0.03552	0.00775	-0.00914	0.0232	0.907	157	0.375
Pair 153	JK JK 1	-0.00072	0.01593	0.00348	-0.00797	0.00654	-0.206	157	0.839
Pair 154	Mastek Mastek 1	-0.0009	0.0439	0.00958	-0.02088	0.01908	-0.094	157	0.926
Pair 155	Kirloskar Kirloskar 1	0.00158	0.04713	0.01028	-0.01987	0.02303	0.153	157	0.88
Pair 156	Gee Gee 1	0.02059	0.0665	0.01451	-0.00968	0.05086	1.419	157	0.171
Pair 157	Gradiente Gradiente 1	0.00467	0.04015	0.00876	-0.01361	0.02295	0.533	157	0.6
Pair 158	Valiant Valiant 1	0.00703	0.03552	0.00775	-0.00914	0.0232	0.907	157	0.375

- **Interpretation:** Above table shows the result of paired t test carried out on the sample to check the possibility of variation in returns due to the event happened. For analysing the same, researcher have set the null hypothesis as, 'The returns of the companies before and after announcement of buy back in are significantly similar', the result in the above table shows that, null hypothesis can be accepted. As all the significant values are more than 0.05, which indicates that null hypothesis for the impugned sample fall in the acceptance area (Level of significance = 5%) and hence we cannot reject null hypothesis.
- **Analysis:** If the acceptance of null hypothesis is analysed then it can be concluded that the event (announcement of Buy-backs) has not caused much effect on the returns of the companies, which shows investors were not able to make supernormal profit, and market establishes the semi-strong form of efficiency.

Findings

1. The test statistics used in the paper aided to find that announcement of the Buy-backs has not caused much impact on its returns.
2. The correlation table which was carried in due course to carry paired t test shows that the returns were significantly correlated.
3. The returns does not follow random path. Hence the possibility of showing weak form efficiency by the market is reduced.
4. Sig. value (P-value) is more than 0.05 in case of every company included in sample. Hence null hypothesis can be accepted.

Conclusion

This paper aimed to check the form of market efficiency in case of Indian stock market, based on 'Event analysis' methodology. The conclusion derived out of statistical test shows that, the event has not caused much impact on the returns of the company, which clearly reduced the possibility of earning supernormal profits by 'investors'. Further the correlation analysis which was a prior test to paired T test showed that the returns are significantly correlated and hence it can be said that they do not follow random walk, which discard the possibility of weak form efficiency of the market too. Hence it can be concluded that the information which comes to the market is interpreted by the investors and is reflected into the prices of the securities, and it defines the Semi-strong form of market efficiency.

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