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Abnormal Returns and Quarterly Earnings Announcements: A Study on BSE 500 Group of Companies

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Abstract

The release of information has an impact on stocks in the market. The release of information process leads toward a shift in either the volume or the price as the release of information causes the old equilibrium level to shift to a new equilibrium as it tries to adjust to the new information. This change is the root cause of abnormal returns and is evident from the relevant change in price level from before the announcement to after the announcement within the event window period. The study involves a 30 day estimation period and 7 day pre and post event window period. The presence of abnormal returns after quarterly earnings announcement is established in the form of day wise abnormal returns, the time the information effect takes to settle and the calculation of net abnormal returns from the pre to the post event window.

Keywords: Quarterly earnings announcements, Cumulative abnormal returns, Post and Pre announcement periods, Event window, Lilliefors test.

Introduction

The time taken for processing of information helps in evaluation of efficiency of any stock exchange. The paper examines the

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informational value of the quarterly reports and whether reaction of the stocks to such information leads to existence of abnormal returns. In India the accounting reports have to follow the standard disclosure norm of the BSE in publication of quarterly information.

Standard accounting policies makes financial statements comparable. 'Interim Financial Results' became mandatory in India after March, 1998. The present research draws strength from previous studies, localizes and analyzes them within the limits of the Indian stock market. The studies by foreign researchers do not apply to the Indian scenario due to different disclosure norms, non availability of data and the absence of stable forecasting sources. In India the unaudited but limited review by the auditors is another unique point as it legitimizes the claim of the statements to a certain extent.

The abnormal returns are at their highest during the 2nd and 3rd quarter. However, the 1st and 4th quarters also show significant abnormal returns after the release of the quarterly information. When the information release takes place price and volume levels change as processing of new information are done by the market. This leads towards a new equilibrium in the market which is the cause of abnormal returns. In India, the stock market overwhelmingly rests on the BSE. 'The Listing Agreement', of BSE, by SEBI, provides more specific and detailed information. This study is based on the information content in the quarterly reports as per clause 41 of the listing agreement.

Literature Review

Beaver (1968) study suggests that investors associate earnings with events and evaluate the same in the prospect of the previous reports when affixing a price to the stock. The study also discovers abnormal rates of return in the two weeks following the earnings announcement. Ball & Brown (1968) study the accounting income numbers for their information content and timeliness. They demonstrate the fact that the information contents of annual earnings announcements relates to stock prices and the value of new information traces back to the absolute value of the stock return. Joy, Litzenberger & McEnally (1977) study concurs that the market depicts a relationship between information content and security prices and that it's possible to earn abnormal returns for a period just after the announcement but the effect fades away as time passes on.

Emanuel (1984) examines the effect of earnings announcements on share prices using cumulative abnormal return method of analysis. Banesh and Peterson (1986) findings show a direct relation between share price fluctuations and unexpected earnings changes. Easton & Sinclair (1989) study indicate that unexpected earnings announcements have a marginal impact on abnormal returns but the impact of unexpected dividends is weaker than unexpected earnings. Ball and Kothari (1991) examine risk, return and abnormal return in the days surrounding quarterly earnings announcements. The evidence reveals that even after controlling for risk abnormal returns are positive. Chopra, Lakonishok & Ritter (1992) studies stocks overreactions to information event. The evidence suggests that the overreaction effect is distinct and stronger for smaller firms and concentrate around quarterly earnings announcements.

McNichols and Manegold (1983) study provides that the marginal information content of an annual report is low after publication of interim reports in comparison to cases where there are no interim reports. Starks and Jennings (1985) studies the information content of accounting disclosures in USA from June 15th to August 21st 1981 and October 4th to December 31st 1982. The results depict different stock price adjustment to different levels of information in the quarterly earnings announcements within two days of the announcement. Mitchell and Mulherin (1994) study US stock exchanges and find a direct relationship between announcements and market activity. Dale (1981) studies US stock exchanges for price changes and trading volume effects during quarterly earnings announcements.

Kim and Verrecchia (1991) re–examines Beaver (1968) study and results indicate trading volume to be a better indicator of information contents in earnings announcement than price. Bamber et al. (1997) study the relationship between trading volume and the earnings announcements. The findings reveal that for earnings announcements generating minimum price changes the trading volume increases significantly. Trueman et al. (2003) examines quarterly returns of information technology company stocks in the USA from January 1998 to August 2000 and finds that stock returns owe part of their existence to price pressure exerted by the market. Bamber (1986) studies the relationship between volumes of stock traded, earnings announcement surprises and firm size.

Basu (1983) again studies relationship between earnings' yield, firm size and returns on the common stock of NYSE firms. The evidence indicates that earnings' yield is not entirely independent of firm size. Dontoh and Ronen (1993) study the information content of accounting announcements. Grant (1980) studies the effect of difference in information contents of stock in US exchanges. The study finds that when the accounting releases are not informational enough the investors try to shift from interim to annual announcements to fill the information gap. Kiger (1972) studies trading volume and stock price reaction to quarterly earnings news in the NYSE in the US. Lipe (1986) studies the relationship between the commonly reported components of earnings announcements and the stock price.

Demski and Feltham (1994) study the market response to financial reports on the basis of information available to the traders. Easton and Zmijewski (1989) studies the information content of accounting earnings. The result relates abnormal returns to unexpected earnings. Jones and Litzenberger (1970) study the announcement of quarterly earnings reports and the stock prices trends during the earnings announcement. Ammann and Kessler (2004) study the processing of information in the Swiss stock market. The results find the market slow in adapting to the new information. The smaller size firms show a higher price impact. The market shows significant abnormal returns even 4 days after the date of the publication of price-relevant information. Bamber et al. (1999) study the relationship and trading volume after earnings announcements.

Otogawa (2003) study of Quarterly earnings in Japan finds that the market liquidity reduces just before and at the time of publication of the earnings announcement. Sharma and Abdel-khalik (1990) examines the information content of earnings announcements. The results indicate that the information news in case of quarterly earnings is not homogeneous across all the quarters in a fiscal year and there exists the possibility that a quarterly effect exists.

Data and Sampling

The current paper uses secondary data in building the database for the research work. The data sources are the BSE website and the CMIE (Centre for Monitoring Indian Economy). The BSE 500 has been the target for selection companies in the database. CMIE contributes to quarterly financial announcements for date of publication of report among others. The BSE 500 initially passes through certain filters. It does not have firms other than April – March year ending, interim dividend declaration, share split/consolidation/buyback, or issued bonus/rights shares, involvement in purchase/sales of assets or merger/acquisitions and has zero trading during the financial year 2009 - 2010. This helps isolate the information effect of the earnings announcement during the entire year. The initial sample consists of 159 companies. It has been divided into several strata. The strata consist of the BSE-Sensex, BSE 100 without the BSE -Sensex, BSE 200 without the BSE 100 and BSE-Sensex and SBE 500 without the BSE-Sensex, BSE 100 & BSE 200. In this way each strata makes the availability of maximum elements from the group. The list opens with 8 from BSE-Sensex, 18 from BSE 100, 41 from BSE 200 and 92 from the rest. The sampling formula has a 97.5% confidence limit with a 2.5% margin of error which is statistically acceptable, (Krejcie & Morgan, 1970*)* and (Banerjee, 2012). This form of sampling allows deeper penetration and ensures better representation of the stocks composing the sub – indexes in comparison of a random sample from the BSE – 500.

For the first list,

$$n_1 = \aleph^2 N P (1-P) \div (d\, 2\, (N-1) + \aleph\, 2P (1-P).) \qquad (1)$$

n_1 = required sample size.

$\aleph^2 = 5.024$. ($\aleph^2$ value at 97.5% with 1 degree of freedom)

N = 8.
P = 0.50(for maximum coverage).
d = 0.025 (margin of error of 2.5%).
n = {(5.024) (8) (0.50) (1-0.50)}/ {(0.025)2 (8-1) + (5.024) (0.5) (1-0.5)}
or, n = 8 (rounded off to zero decimals).

This ensures the maximum representation from the BSE-Sensex group of companies. The replication of the above process continues for the next 3 strata. The second list from BSE – 100 has all the 18 elements. The third list from BSE – 200 has 41 companies which gives 40 for the final list. The final list BSE – 500 with 92 companies gives 88 for the final list. This completes the sample list for the paper. The sample size comes by adding the respective sample from each stratum which adds up to 154. The efficiency of the method of stratification is clear as the same from a single list of 159 companies by simple random sampling gives a sample of 147 companies. The test also exceeds the random sampling size given for 159 companies at 99% confidence level with a margin of error of 0.5%, with sample size being 151.

The choice is made by arranging the companies in sequence in alphabetical order with serial no. starting for the first list from 001 to 008 for BSE Sensex. In the case of the second group, from BSE – 100, the serial no. ranges from 009 to 026. As full list selection has been done the random numbers do not have any use here. Now for the third list, from BSE 200 the serial no. starts from 027 to 067 and the random no. list comes into play to find one out of the list. The policy of exclusion is easy as it chooses one out of the list rather than choose 40 out of 41 firms. In case of the last list from BSE – 500 with 92 companies, the serial no. ranges from 068 to 159 and the random no. list is looked up for the last 3 digits for 068 to 159 the for finding 4 nos. for exclusion from the list. The period under consideration starts from the 1st April, 2009 to 31st March, 2010. This period consists of 616 quarterly announcements.

Normality and Z Tests

The paper undergoes tests to prove the representative capacity of the sample with respect to the total master population. A test of normality, Lilliefors Test, of data is as a pre – requirement for this purpose. The next test is the Z- test. The tests are as below:

Lilliefors Test

The assumption of normality is a major standard statistical procedure. The test is a modification of the Kolomogorov-Smirnov test of goodness of fit or the Lilliefors test for normality. This test of normality defines a criterion and when the probability associated with the criterion is smaller than a given level, the data structure is taken to be normal. The distribution of the values of the criterion gives an approximation of the sampling distribution. There are some small problems with the current tables for the Lilliefors test. The tables originate from mall number of samples in the original simulations and limited number of critical values. Lilliefors reports the critical values for α = [0.20; 0.15; 0.10; 0.05; 0.01]. The Lilliefors test takes the first step by using z scores:

$$Z = \frac{X - \overline{X}}{\sigma}, \tag{1A}$$

where, X = The sample unit, $\overline{X}$ = The Mean, and

σ = The SD

The Z score calculation starts by calculation of the mean, then subtracting the mean from every unit and then calculating the variance and the sum of variances and their mean. The square root of the sum of variance provides the SD. Then the mean is subtracted from the unit and divided by the SD to get the individual Z score. The scores are arranged from the lowest to highest and then the CFD (cumulative frequency distribution) of scores (expressed as proportions— with 50 scores, each score is one fiftieth of the total or 0.02). If two units end up with scores of 3, they both share the same location on the cumulative distribution i.e. 0.06. Then the standard normal curve table provides the proportion of the area to the left of the particular Z score. If the Z score is negative then its' subtracted from 0.5 and if positive its' added to 0.5 and identified as "area below z". Then the same is subtracted from the CDF value and the absolute score taken. If test statistic is smaller than the critical value the assumption of a normal distribution continues to be tenable. In the case of price the closing price of 18 January 2010 has been taken. The test table provides for α risk values in the range of 4 to 50. The group size variation checks the effect of change in group size on the normality factor. The price tests are done in batches of 50, 50, 30, 15 and 8 totalling 153 i.e. over 99.35%. The single item left out is over 1678 times the lowest and 15 times penultimate item in terms of individual share prices. The inclusion of this complicates the value of mean and SD. All the batches conform to the test at different α risk values. The 1st batch of 50 at 0.20, the next batch of 50 at 0.10, the next batch of 30 at 0.20, the next batch of 15 at 0.01 and the final batch of 8 at 0.20. Then the values are arranged and sorted into groups with continuous class range of 400 and all the 153 values fill up the table in order to form the histogram which provides proof of normality.

Table 1.1 Frequency Table for full sample stock Prices

	X	F
	200	105
0-400	600	22
800-1200	100	13
1200-1600	1400	9
1600-2000	1800	2
200-2400	2200	1
2400-2800	2600	2
2800-3200	19900	0

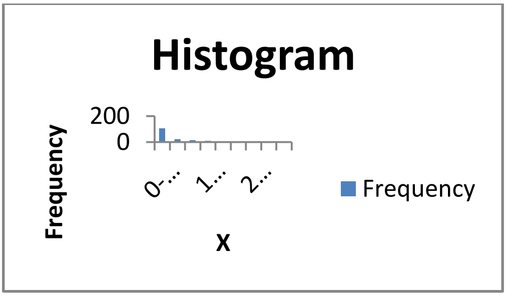

Fig. 1.1Histogram from Stock Prices

A sample graph from the 1st batch clearly shows the bell shaped nature of the curve.

Table 1.2 Chart for Z Graph

Class Range	Mid Value	Frequency
0 – 30	15	2
30 – 60	45	8
60 – 90	75	14
90 – 120	105	15
120 – 150	135	9
150 – 180	165	2

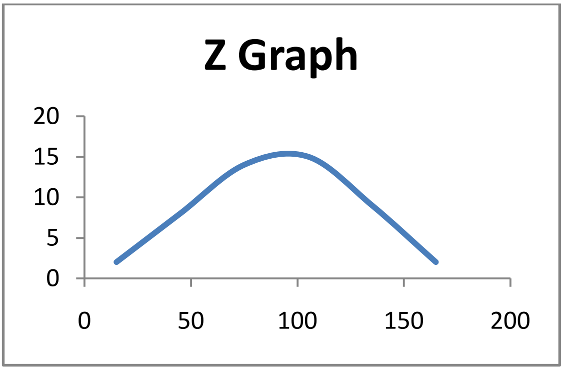

Fig. 1.2 : Z graph from Lilliefors test

Z Test

The Z-test compares sample and population means to determine any significant difference. It requires simple random sample from population with Normal distribution with a known mean which explains the purpose of the normality test. The Z value indicates the number of standard deviation units of the sample from the population mean. The main purpose of the test is to establish the representative capacity of the sample from the population. The sample and population price comes from 18th January 2010 closing prices for BSE-500 and the 154 sample companies.

The formula in use is as below:

$$Z = \frac{\overline{X} - \mu}{SE} \tag{2}$$

$$SE = \frac{\sigma}{\sqrt{n}} \sqrt{\frac{N-n}{N-1}} \tag{3}$$

where, $\overline{X}$ = Sample Mean, μ = Population Mean,
N = Population Size, n = Sample Size,
σ = Population SD, SE = Standard Error.

The prices are added up and the mean is found out. Then the mean of the total is subtracted from each individual sample and squared to find the variation and square root of the same. This is then added up and the mean calculated. The standard error is the population SD and the population and sample size. The SD calculation is done by subtracting the mean of the individual price range from each individual sample and population unit, squared and the square root taken. The sum is the obtained by adding up the individual values and the mean obtained. The Z value is calculated by subtracting the population mean from the sample mean by dividing the same by the standard error. The |Z| value of 4.15 confirms more than 99% confidence limit. The confidence interval test follows next:

$$\overline{X} \pm \sigma \text{ for 95\% confidence limit} \tag{4}$$

The sample mean of Rs.669.04 and SD of Rs.703.10 gives a range of Rs.1, 167.08 to Rs.171.02 . The population mean Rs.530.19 falls within the range and hence suffices the 95% significance limit test.

Methodology

This paper investigates whether there are abnormal returns from before to after the information event which is the announcement of the quarterly returns. This study uses all the 4 Quarters for the financial year 2009 – 2010 (April'09 – March'10) i.e. June, 2009, September, 2009, December, 2009 and March, 2010 for this purpose.

The announcement time is given by the notation 'τ', with data from the CMIE Prowess and BSE. The event window ranges from a certain number of days before the event (pre-event window) to a certain number of days after the event (post event window) in this case 7 days (both pre and post announcement). The event day belongs to none of the windows. The pre event window starts eight days before the event and ends one day prior to the event; post window also ends and starts eight days from and one day after the event. Here T_{-7} is the first day of the pre-event period. This paper focuses on the pre-event to the post-event window which is (T_{-7} – T_{+7}) days to evaluate the speed of information processing and look for the presence of abnormal returns from before to after the event. The market model is put to use which allows the separation of the systematic and the firm-specific component of the overall stock returns.

The model is as follows (Ammann & Kessler (2004)):

$$R_{i,t} = \alpha + ß_i R_{M,t} + \epsilon_{i,t} \tag{5}$$

where ,

$R_{i,t}$ = The continuously compounded rate of return of the respective stock upon occurrence of event 'i' on time 't'.

$R_{M,t}$ = The continuously compounded rate of return of the market index BSE – 500 upon occurrence of event 'i' on time 't'.

α = The intercept of a straight line or the α coefficient of the 'i^{th}' security.

β_i = Slope of a straight line or the β coefficient of the 'i^{th}' security.

$\epsilon_{i,t}$ = Error term with mean zero and the standard deviation, a constant amount at the time period 't'.

The focus is now on β calculation. β is that part of the risk premium that varies across assets (unique risk) and theoretical representation is as follows:

$$\beta = [\text{cov}\ (R_i,R_m) / \sigma^2_{R_m}], \tag{6}$$

where, cov (R_i,R_m) = Co – Variance of the individual asset with that of the market portfolio.

$\sigma^2_{R_m}$ = Variance of the market rate of return.

The value ranges from 1 > β ≥ 1, β = 1 for assets carrying the same risk as the market portfolio, β > 1 for assets with more risky than the market portfolio and β < 1 for assets that are less risky than the market portfolio. The β calculation is as follows:

$$\beta'_i = \frac{\sum_{t=1}^{N}(R_{m,,t}, R_{i,t}) - \sum_{t=1}^{N}(R_{m,,t}) \sum_{t=1}^{N}(R_{i,t})}{\sum_{t=1}^{N}(R^2_{m,t}) - \left(\sum_{t=1}^{N}(R_{m,t})\right)^2} \tag{7}$$

where,

β' i= Slope of the straight line or beta coefficient of security 'i'.
$R_{m,t}$ = Return on market index BSE – 500 during time period 't'.
$R_{i,t}$ = Return on security 'i' during time period 't'.
with,
$R_{m,t}$ = ln [(BSE – 500Closing$_{(t-1)}$/BSE – 500 Closing$_{(t)}$] for the day 't' (8)

$R_{i,t}$ = ln [($P_{i,t-1}$-Closing/$P_{i,t}$- Closing] for the day 't'. (9)
where,
BSE – 500 Closing$_{(t-1)}$ = Closing value of BSE – 500 index for the day't-1'.
BSE 500 Closing$_{(t)}$ = Closing value of BSE – 500 index for the day 't'.
$P_{i,t-1}$-Closing = Closing price for share of firm 'i' at the end of day 't-1'.
$P_{i,t-1}$ Closing = Closing price for share of firm 'i' at the end of day 't'.

The calculation of β' and α' is done from such values. α is only a measure of performance on a risk adjusted basis comes next. It's the abnormal rate of return on the stock predicted by an equilibrium model and is calculated as follows:

$$\alpha'_i = (\overline{R_{i,t}} - \beta_i \overline{R_{m,t}}) \text{ for the day-'t'}, \tag{10}$$

where α' i = Slope of the straight line or alpha coefficient of security 'i'.

β' i = Slope of the straight line or beta coefficient of security 'i'.

$\overline{R_{m,t}}$ = Mean Rate of return on the market index BSE – 500 during the period 't'.

$\overline{R_{i,t}}$ = Mean Rate of return on the security 'i' during the period 't'.

The β calculation is done before α as the value of the latter depends on the former. Static beta has been put to use here for the 4 quarters. The determination of parameters is done by data away from the estimation window. The regression has been done using a time period of 30 trading days, a calendar month before last day of the respective quarter. The choice of days is 30 as any longer period may un-necessarily contaminate the values by any effect of any previous period or current period. The replication of the process is done for all the quarters. The parameters for the determination of the abnormal returns are done with data of the sample companies outside the event widow period. The calculation for the value of β is done first. The calculations for the quarters have done in reverse order i.e. from the 4th to the 1st quarter. In case of 4th quarter the estimation period stretches from 15th of January, 2010 to 26th of February, 2010. The R_m calculation is done first. The closing of BSE 500 index for each of the thirty trading days and the respective previous day is taken in a table format. Then the closing value of the previous day is divided by the closing value of the day. This gives the rate of return on BSE 500 index for the day. The objective being to find the continuous compounding rate is done by taking the natural logarithm (LN) of that no. Then the calculation of sum of the returns is done along with their mean is done by dividing the sum by 30. Then the individual values are squared and the sum of the same obtained. The repetition of the same is done for the 3rd quarter from 17th of October, 2009 to 30th of November, 2009. The

2^{nd} quarter runs from 21^{st} July, 2009 to 31^{st} August, 2009 and the 1^{st} quarter from 16^{th} April, 2009 to 29^{th} May, 2009. The reason why 30 trading days are not equal to a calendar month is that trading does not take place in all the 30 days of the month, so in most cases some days of the previous month have been taken to complete 30 trading days.

This next step comes in the form of calculation of R_i. The date range is the same for 4 quarters. The process is same but in this case the closing price of the previous day and closing prices of the day for the shares are taken. In the case of the 4^{th} quarter the 154 stocks are first arranged in alphabetical order, the period being 15^{th} of January, 2010 to 26^{th} of February, 2010. The closing price of the previous day and closing prices of the day for each stock is taken and the previous days' closing price is divided by the day's closing price. Now as all firms will do not trade every day, the day in which a trading is absent the closing price of the day has been taken as zero. Likewise the rate of return is zero or infinity. Now, the natural logarithm value put to use as before to calculate continuous compounding rate has been taken to be zero as there is no solution in natural log for zero or infinity. Along with this the sum total of all the firms for the trading period of 30 days along with the mean of the same which is obtained. Then R_i and R_m and their derivatives are arranged in a table for each day of the quarter and by using formula (8) and (10) the calculation for values of β and α is done. The calculation provides individual β and α for all 154 sample companies. The process undergoes repetition for all the quarters. The abnormal returns are equal to the residual of this regression or:

$$A_{i,t} = R_{i,t} - \alpha'_i - \beta'_i R_{m,t} \tag{11}$$

where, estimation of α' and β' are done by the regression of this market model with the absolute abnormal returns estimation being both before and away from each event window. The hypothesis is as follows:

Hypothesis 1 (Null Hypothesis): That abnormal return does not exist after the announcement of the quarterly announcement news.

Hypothesis 2 That there exists a difference in cumulative aggregate abnormal returns from before the after the quarterly announcement news or abnormal returns exists.

Now before the calculation for abnormal return is done the calculation for market rate of return for the period must is necessary. The 4th quarter is taken first of all for this purpose. First, all the 154 sample companies are arranged in alphabetical order. The table contains the last date of the quarter and date of declaration of the results of the particular firm for the respective quarter. Then the BSE 500 index closing of the previous day and closing of the day for each of the pre and post event window period for each company are taken, the time horizon being 7 days. The date excludes the announcement date. Then the closing price of the previous day is divided by closing prices of the day which gives the rate of return on BSE 500 index for the day. Then the natural logarithmic value is taken for the period for all the rates of return. The repetition of the same is done for the 3rd quarter from 17th of October, 2009 to 30th of November, 2009. The 2nd quarter starts from 21st July, 2009 to 31st August, 2009 and the 1st quarter runs from 16th April, 2009 to 29th May, 2009. The $\aleph^2$ test comes in here. The test is done to check whether the natural logarithmic values act as a true representation of the actual rates of return. The study period for the hypothesis is ±7 days from the event date. The relevant hypothesis is as follows:

Hypothesis 1 (Null Hypothesis): The values of natural logarithms of the rates of return are not acceptable as a continuously compounded rate of return of the absolute rates of return.

Hypothesis 2 That the values of natural logarithms of the rates of return are acceptable as a continuously compounded rate of return of the absolute rates of return.

In this case the mean of sum total of all natural logarithms of rates of return have been taken as the expected return and the mean of actual as the observed return. The 4th quarter has been taken first. Then summation is done and both divided by the no. of sample units i.e. 154. Then the normal process of calculating $\aleph^2$ is followed. The process undergoes repetition for all the quarters. The test for

$\aleph^2$ is done for six degrees of freedom for the respective quarters, as the number of days for both pre and post event window are 7, so the respective degree of freedom is 6. The results stand ground for a 99% confidence level with a 1% margin of error, the value in the respective $\aleph^2$ table being 10.6450 for 6 degrees of freedom.

The results of the 4 quarters for the pre and post event window fall below the respective value and hence the hypothesis that the logarithmic returns are acceptable as the continuously compounded rate of absolute rates of return is accepted and the null hypothesis is rejected. The following table depicts the $\aleph^2$ values for the pre and post event window period as follows:

Table: 1.3 Chi-Square Values – Pre & Post Event Window Period

$\aleph^2$	$\aleph^2$
Pre	Post
2.9694	2.3838
3.6550	3.2716
3.6981	3.1224
4.9866	4.4294

The validation leads to the calculation of the abnormal rates of return. It's the presence or absence of the abnormal return that justifies the information content of the quarterly report. The abnormal returns come from firm specific factors. The abnormal returns in the event window determines whether there are systematic and significant abnormal returns surrounding the event window. The presence of such return indicates movements only due to the effect of the information content of the earnings announcement. If there is no such effect then the event has no impact on the behaviour of stock return around the event window.

The calculation of the abnormal returns is done first for the 4th quarter. Along with abnormal returns, calculations are also done for Cumulative Aggregate Abnormal Returns, the calculation of the residual element in the regression equation (Єi) and the variation for the same ($\sigma_{\varepsilon^2 i}$), variation of abnormal returns and square root of the same and the statistic Θ_1. The calculation for abnormal returns is done using equation (12) and the values of β and α for the 4th quarter. This gives abnormal returns for each of the sample companies for the pre and post event window period. The calculation for the residual element is done using equation (14) below. The residual variation $\sigma_{\varepsilon^2 i}$ in equation (8) is calculated first by finding out all the residual value using equation (12), taking sum and mean and then squaring the difference between the individual residual item and the mean value to calculate to calculate the respective variance. The repetition of the same is done for the quarters.

$$CAR_i\,(T_{-7}, \tau) = \sum_{T=1}^{\tau-1} AR_{i,t} \qquad (12)$$

with variance respective

$$\sigma_i^2\,(T_{-7}, \tau) = (\tau - T_{-7})\,\sigma_{\varepsilon\, i}{}^2 \qquad (13)$$

where, $\sigma_{\varepsilon^2 i}$ = The residual variance from the market model for the announcement days, and $\epsilon_{i,t} = r_{i,t} - A_{i,t}$ (14)

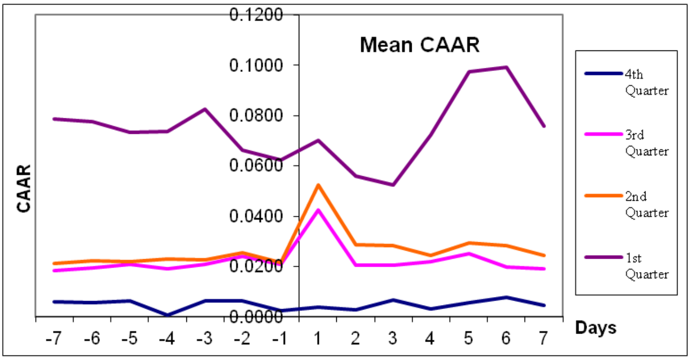

Fig.: 2.1 Mean CAAR

Table 2.1 (Pre) Mean CAAR (Post)

Quarter	-7	-6	-5	-4	-3	-2	-1
4th	0.0061	0.0057	0.0065	0.0008	0.0064	0.0064	0.0024
3rd	0.0184	0.0193	0.0208	0.0189	0.0210	0.0242	0.0208
2nd	0.0213	0.0222	0.0219	0.0232	0.0228	0.0254	0.0217

Quarter	1	2	3	4	5	6	7
4th	0.0040	0.0029	0.0066	0.0033	0.0057	0.0079	0.0046
3rd	0.0425	0.0207	0.0206	0.0218	0.0251	0.0200	0.0190
2nd	0.0524	0.0287	0.0282	0.0245	0.0293	0.0284	0.0244
1st	0.0703	0.0558	0.0525	0.0723	0.0973	0.0993	0.0758

The 4th quarter shows movement from the top right down the down left corner of the sheet. In case of pre event period the value rises on the 1st day and falls on the 2nd day, rises on the 3rd day and falls back on the 4th day. It rises on the 5th and falls on the last day. In case of post event period it rises on the 1st day and falls on the 2nd day and follows a similar pattern and falls finally on the last day. The 3rd quarter shows upward movement from the 1st to the 6th day of the pre event window and falls on the last day of the pre event window. It again rises on the 1st and falls on 2nd day of the post event window. It again rises on the 4th and 5th day of the post event window and falls on the last two days of the post event window. In case of the 2nd quarter in the pre event period there is a rise on the 2nd day and fall on the 3rd day, a rise on the 4th day which falls on the 5th day following the pattern for 6th & 7th days. In the post event period it rises on the 1st day and falls continuously throughout to the 4th day, rising on the 5th and falling on the last day. The 1st pre event window rises on the 1st day and falls back up to the 4th day, rises on the 5th day and falls up to the last day. In case of post event period it rises on the 1st day and falls on the 3rd day, rises on the 4th and falls on the last day of the post event window. This presents a picture of the presence of abnormal returns from the graph.

The variance of the abnormal returns comes into play as the mean cumulative abnormal return is not sufficient by itself to provide any conclusive evidence on the existence of the net abnormal returns. The variance calculation is done for 7 days of pre event window and post event window. Then the mean calculation of the abnormal returns is done for all the days in the pre and the post event window, i.e.

$$\overrightarrow{CAR} = \frac{1}{N} \sum_{I=1}^{N} \mathrm{CAR}_i\,(T_{-7}, \tau) \qquad (15)$$

In this paper an assumption has been made about the non correlation of abnormal returns of the events which leads to the variance of the abnormal return as:

$$\mathrm{var}\,(\overrightarrow{CAR}\,(T_{-7}, \tau)) = \frac{1}{N} \sum_{I=1}^{N} \sigma_i^2\,(T_{-7}, \tau) \qquad (16)$$

The tests can also prove whether there are significant abnormal returns on special days before the event. For this the average abnormal returns calculation for a specific day in the event window is done and the average for all events is taken as follows:

$$\overrightarrow{AR}\,(T^*) = \frac{1}{N} \sum_{I=1}^{N} \overrightarrow{AR}_i\,(T^*) \text{ with } T^*\ [T_{-7}, T_7]. \qquad (17)$$

not necessary in this case as there is only one event here. The resulting variance is:

$$\mathrm{var}(\overrightarrow{AR}\,(T^*)) = \frac{1}{N^2} \sum_{I=1}^{N} \sigma_{\epsilon i}^2\,(T^*) \qquad (18).$$

This results in the following test:

$$\Theta_1 = \frac{\overline{\mathrm{AR}}(T^*)}{\sqrt{Var(\overline{AR}(T^*))}} \qquad (19)$$

The value of $\sigma_{\epsilon i2}$ calculation has already been done previously along with the individual abnormal returns. The $\sigma_{\epsilon i}^2$ value is divided by the square of the number of units in the sample i.e.154 and the square root of the value is taken. The abnormal return of a specific day for a specific company in the 4th quarter is then divided individually by the value obtained from the square root. This provides the individual Θ_1 statistic for the particular day for the individual company. The sum gives the Θ_1 value for the particular day in the pre or post event window period. The process undergoes repetition for every day of the pre and the post event window period and calculates a whole series of value for the entire period. This is very useful in determining how long the market takes to process the information and also the individual peak abnormal returns in both the pre and post event window period.

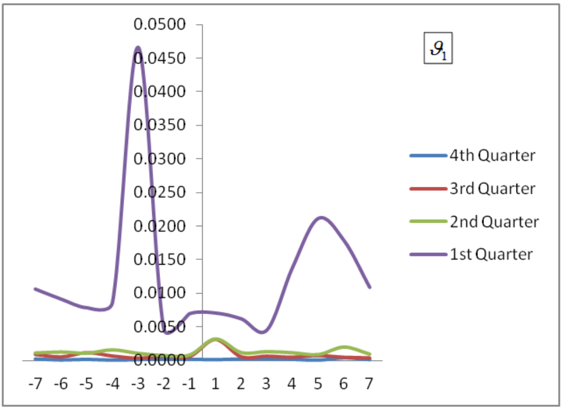

Fig. 2.2 Daily Abnormal Returns

Table 2.2 (Pre) Daily Abnormal Returns (Post)

Quarter	-7	-6	-5	-4	-3	-2	-1
4th	0.0002	0.0000	0.0001	0.0000	0.0001	0.0002	0.0001
3rd	0.0009	0.0006	0.0012	0.0007	0.0004	0.0007	0.0006
2nd	0.0012	0.0013	0.0011	0.0016	0.0011	0.0008	0.0008
1st	0.0107	0.0092	0.0079	0.0087	0.0467	0.0047	0.0070

Quarter	1	2	3	4	5	6	7
4th	0.0001	0.0002	0.0002	0.0001	0.0000	0.0003	0.0001
3rd	0.0031	0.0006	0.0007	0.0005	0.0008	0.0005	0.0004
2nd	0.0032	0.0012	0.0013	0.0012	0.0009	0.0020	0.0010
1st	0.0071	0.0063	0.0046	0.0139	0.0212	0.0179	0.0109

The value for the 4th quarter is highest on the 6th day of the post announcement event window and is lowest on the 2nd and 4th day of the post and 5th day of the pre announcement window. In all it takes about 6 days for the information effect to stabilize for this quarter. The 3rd quarter sees its' highest on the 1st day of the post event window and the lowest on the 3rd day of the pre and last day of the post event window. In all it takes about 2 days for the information effect to stabilize. The 2nd quarter sees highest on the 1st day of the post event window and the lowest on the last day of the pre event window. In all it takes about 2 days for the information effect to subsidize. The 1st quarter sees the highest on the 4th day of the post event window and the lowest on the 3rd day of post announcement event window. It takes about 6 days for the information effect to subsidize.

All the previous tests have given enough hints on the existence of some form of abnormal return after the announcement of the quarterly returns. The next test specifies whether the cumulative returns in the post-event window are significantly different from the cumulative returns in the pre-event window. Once the release of the new information takes place via announcement event, the market needs some time to adjust prices in response to the event. This test aggregates the above effect and provides for the presence of abnormal returns in the market. Both event windows have the same length i.e. it includes the entire time span of ± 7 days. The price movements take place on the day of the information release and a few days after. This results in the following test specification:

$$CAR_i^{pre}\,(T_{-7}, \tau, p) = \sum_{t_1+p}^{\tau-1} AR_{i,t} \quad (20)$$

$$CAR_i^{post}\,(T_{+7}, \tau, p) = \sum_{\tau+p+1}^{T_2} AR_{i,t} \quad (21)$$

$$\overrightarrow{CAR}^{\,pre}\,(T_{-7}, \tau, p) = \frac{1}{N} \sum_{I=1}^{N} CAR_i^{\,pre}\,(T_{-7}, \tau, p) \quad (22)$$

$$\overrightarrow{CAR}^{\,post}\,(T_{+7}, \tau, p) = \frac{1}{N} \sum_{I=1}^{N} CAR_i^{\,post}\,(T_{+7}, \tau, p) \quad (23)$$

$$\sigma_i^2\,(T_{-7}, \tau, p)^{pre} = (\tau - T_1 - p)\,\sigma^2_{\epsilon i\ pre} \quad (24)$$

$$\sigma_i^2\,(T_{+7}, \tau, p)^{post} = (T_2 - \tau - p)\,\sigma^2_{\epsilon i\ post} - \quad (25)$$

$$\text{var}^{est}\overrightarrow{CAR}^{\text{ pre}}\,(T_{-7},\tau\,,p) = \frac{1}{N^2}\sum_{I=1}^{N}\ \sigma_{\epsilon i}{}^{2}\,(T,\tau\,,p)^{pre} \qquad (26)$$

$$\text{var}^{est}\overrightarrow{CAR}^{\text{ post}}\,(T_{+7},\tau\,,p) = \frac{1}{N^2}\sum_{I=1}^{N}\ \sigma_{\epsilon i}{}^{2}\,(T,\tau\,,p)^{post} \qquad (27)$$

$$\Theta_2 = \frac{\overline{\text{CAR}_i^{\text{pre}}}(T_{-7},\tau,p) - \overline{\text{CAR}_i^{\text{post}}}(T_{+7},\tau,p)}{\sqrt{Var^{est}(\overline{CAR}^{pre}(T_{-7},\tau,p)) + Var^{est}(\overline{CAR}^{post}(T_{+7},\tau,p)))}} \qquad (28)$$

The statistic Θ_2 tests for difference in the pattern of average cumulative aggregate abnormal returns before and after the event. The variance calculation has been done assuming that the variance for the pre event window is equal to the variance in the estimation period. The post-event window variance calculation is done from data observations within the estimation window. In this case both the pre and post event period variation have been taken into consideration from estimation period as the calculation of the abnormal returns need similar variation from both the periods to satisfy the specifications of the formulation. The calculation process is same as before with minor variations. The cumulative normal returns for each day of all the quarters have already been done. Now the 4th quarter pre and post event window period abnormal returns are summed up for each individual day over the entire period. The calculation for the sum and mean is done. Then the individual mean cumulative abnormal return of the pre and post event window period is added up to provide separate grand totals for the pre and post event window. The difference of the grand total of the pre event window mean cumulative abnormal return with the grand total of the post event window mean cumulative abnormal return forms the numerator of equation (28).

The residual variation $\sigma_{\varepsilon^2_i}$ in equation is calculated by finding out all the residual value using equation (15), calculating sum and mean and then squaring the difference between the individual residual item and the mean to calculate the respective variance. The same variance has been put to use in equation (26) and (27). The difference being that the same is now divided for each individual value by the square of the no. of sample units. The sum of such daily variances is taken for each day of the pre and post event window period. Then the daily sum of the same is added up individually for the pre and post event window period. Then the grand total of the pre and post event window variance is added up and the square root of the grand sum is to form the denominator of the equation (28). The result is the numerator which contains the net difference of the pre and poet event window abnormal cumulative returns and the denominator is the result of a square root. The presence of the same denotes the existence of the abnormal returns after a quarterly earnings announcement window.

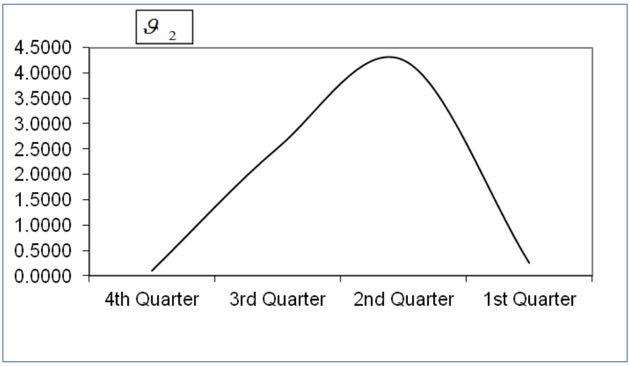

Fig. 2.3 Absolute Abnormal Returns

Table 2.3 Absolute Abnormal Returns

ϑ_2	
4th Quarter	0.0985
3rd Quarter	2.5251
2nd Quarter	4.2604
1st Quarter	0.2539

The above table proves the presence of absolute abnormal returns in all the 4 quarters. The effect is more in the 2nd and the 3rd quarter rather than the 1st and 4th quarters. The 2nd and 3rd quarters are independent of any such effects and the abnormal returns flourishes in these two quarters.

Result

The study on abnormal returns has been done in various stages. In the first stage the calculation of α and β are done from the estimation period of 30 trading days. Then the pre and post event window of 7 days has been setup for study. The $\aleph^2$ test method has verified the use of natural logarithms. This leads to the verification for the presence of abnormal returns. The table and Fig. 2.1 first shows the presence of mean cumulative aggregate abnormal returns during the post event window period. Then we have the statistic Θ_1. It points to the particular days when the abnormal returns are very high during the pre and post event window period and also reveals the average time taken by the market to settle down after release of the information. The statistic Θ_2 tests for a difference in the pattern of average cumulative aggregate abnormal return during the pre and post event window. The Θ_2 table proves the presence of abnormal returns in all the 4 quarters.

The effect is most prominent in the 2nd and 3rd quarters. The 4th quarter result generally comes with the annual audited results and the 1st quarter results date falls within the range of the time limit for submission of the previous year's annual audited results which might be a cause in the limitation of the abnormal returns. The 2nd and 3rd quarters are independent of any such effects and abnormal returns are more prominent in these two quarters.

Then the acceptance of the hypothesis follows:

Hypothesis 2: That there exists a difference in cumulative aggregate abnormal returns from before the event than after the announcement of the quarterly announcement news or in other words abnormal returns exists.

The data from the Θ_1 and Θ_2 tables along with the mean cumulative aggregate abnormal returns table convincingly proves the hypothesis that there exists a difference in the cumulative aggregate abnormal returns from before the event than after the event during the pre and post abnormal window or in other words abnormal returns exists. The hypothesis is accepted and the null hypothesis is rejected.

Conclusion

When the release of information takes place the process leads towards a new equilibrium in the market. The market adjusts to the new information in this manner which is the root cause of abnormal returns. The paper studies the effects of abnormal returns in the lime light of the after math of the information release in the market. The study concerns itself with the pattern of quarterly reports in India on the basis of clause 41 which is the BSE standard of reporting the quarterly information to the exchange. The sampling process picks 154 as the final sample figure. The study uses the 4 quarters of the financial year April, 2009 to March 2010 for this purpose and the financial year April, 2009 to March, 2010. The paper studies the presence of abnormal returns. The study consists of a 30 day estimation period and a 7 day pre and post event window. The estimation period is used to calculate the standard values of the coefficients from the linear regression- in this case the normal market model equation. Then this is used to calculate the residual factor and the abnormal return in both the pre and the post event window period. Then the presence of abnormal returns after the earnings announcement is convincingly established in the form of day wise abnormal returns, the time taken for the information effect to subsidize and the net abnormal returns from the pre to the post event window confirming that abnormal returns exists after the release of the quarterly earnings announcement.

References

Abdel-khalik, R. A. (1990). Specification problems with information content of earnings: Revisions and rationality of expectations and self-selection bias, *Contemporary Accounting Research*, 7, 142–172. doi: 10.1111/j.1911-3846.1990.tb00805.x.

Ammann, M. & Kessler, S.(2004.) Information processing on the Swiss stock market, *Financial Markets and Portfolio Management*, 18(3), 256-283.

Ball, R. & Brown, P. (1968). An empirical evaluation of accounting income numbers, *Journal of Accounting Research*, 6(2), 159–178. doi./10.2307/2490232.

Ball, R. & Kothari, P. S. (1991). Security returns around earnings announcements, *Accounting Review*, 66(4), 718 – 738.

Bamber, L. S. (1986). The information content of annual earnings releases: A trading volume approach, *Journal of Accounting Research*, 24(1), 40-56. doi/10.2307/2490803.

Bamber, L. S, Barron, E. O. & Stober, L. T. (1997). Trading volume and different aspects of disagreement coincident with earnings announcements, *The Accounting Review*, 72 (4), 575 – 597.

Bamber, L.S., Barron, E. O. & Stober, L. T. (1999). Differential interpretations and trading volume, *Journal of Financial and Quantitative Analysis*, 34 (3), 369–386. .doi/10.2307/2676264.

Banerjee, K. (2012). Volume reactions to quarterly earnings announcements: A study on BSE 500 group of companies, *Indian Journal of Accounting*, 52 (2), 68-80.

Basu, S. (1983). The relationship between earnings yield, market value, and returns for NYSE common stocks: Further evidence, *Journal of Financial Economics*, 12 (1), 129–156. doi/10.1016/0304-405X(83)90031-4.

Beaver, H. W. (1968). The information content of annual earnings announcements, *Journal of Accounting Research*, 6, 67 – 92. doi/ 10.2307/ 2490070.

Benesh, A. G. & Peterson, P. P. (1986). On the relation between earnings changes, analysts' forecast & stock price fluctuations, *Financial Analysts Journal*, 29 – 57.

Chopra, N., Lakonishok. J. & Ritter, R. J. (1992). Measuring abnormal performance: Do stocks overreact, *Journal of Financial Economics*, 31(2), 235-268. doi/10.1016/0304-405X(92)90005-I.

Dale, M. (1981). Price and Trading Volume Reaction Surrounding Earnings Announcements: A Closer Examination, *Journal of Accounting Research*, 19(2), 374-383. doi/10.2307/2490871.

Demski, S. J. & Feltham, A. G. (1994). Market response to financial reports, *Journal of Accounting and Economics*, 17 (1-2), 3-40. doi./10.1016/0165-4101(94)90003-5.

Dontoh, A. & Ronen, J. (1993). Information content of accounting announcements, *The Accounting Review*, 68 (4), 857-869.

Easton S & Sinclair N A, (1989), The impact of unexpected earnings and dividends on abnormal returns to equity, *Accounting and Finance*, 1-19.

Easton, P. & Zmijewski, M. (1989). Cross-sectional variation in the stock market response to the announcement of accounting earnings, *Journal of Accounting and Economics*, 11 (2-3), 117-141.

Emanuel, D. (1984). The information content of sign and size of earnings announcements: New Zealand evidence, *Accounting and Finance*, 25 (43).

Grant, E. B. (1980). Market Implications of differential amounts of interim information, *Journal of Accounting Research*, 18 (1), 255-268. doi./10.2307/2490401.

Jennings, R. & Starks, L. (1985). Information content and the speed of stock price adjustment, *Journal of Accounting Research*, 23 (1), 336 – 350. doi/10.2307/2490922.

Jones, C. P. & Litzenberger, R. (1970). Quarterly earnings reports and intermediate stock price trends, *Journal of Finance*, 25, 143–148. doi/10.1111/j.1540-6261.1970.tb00420.x.

Joy, M., Litzenberger H. R. & McEnally, W. R. (1977). The adjustment of stock prices to announcements of unanticipated changes in quarterly earnings, *Journal of Accounting Research*, 15 (2), 207-225. doi/10.2307/2490349.

Kiger, J. (1972). An empirical investigation of NYSE volume and price reactions to the announcement of quarterly earnings, *Journal of Accounting Research*, 10 (1), 113-128. doi/10.2307/2490222.

Kim, O. & Verrecchia, E. R. (1991). Trading volume and price reactions to public announcements, *Journal of Accounting Research*, 29 (2), 302 – 321. doi/10.2307/2491051.

Krejcie, V. R. & Morgan, W. D. (1970). Determining Sample size for research activities, *Educational & Psychological Measurement*, 30, 607-610.

Lipe, C. R. (1986). The information contained in the components of earnings, *Journal of Accounting Research*, 24, 37–64. doi/10.2307/2490728.

Mangala, D. (2008). Patterns in indian common stock returns - An evidence of day of the week effect, *Indian Management Studies Journal*, 12, 53-66.

May, G. R. (1971). The influence of quarterly earnings announcements on investor decisions as reflected in common stock price changes, J*ournal of Accounting Research*, 9, 119 – 163. doi/10.2307/2490094.

McNichols, M. & Manegold, G. J. (1983). The effect of the information environment on the relationship between financial disclosure and security price variability, *Journal of Accounting and Economics*, 5, 49–74.

Mendenhall, R. R. (2002). How naive is the market's use of firm specific earnings information, *Journal of Accounting Research*, 40(3), 841 – 863. doi/10.1111/1475-679X.00073.

Mitchell, L. M. & Mulherin, J. H. (1994). The Impact of public information on the stock market, *Journal of Finance*, 49 (3), 923-950. doi/10.1111/j.1540-6261.1994.tb00083.x.

Otogawa, K. (2003). Market liquidity around earnings announcement: Evidence from Japan, discussion paper series-Kobe University, *Japanese Association of Management Accounting*, 6, 1-28.

Starks, L. & Jennings, R. (1985). Information content & The speed of stock price adjustment, *Journal of Accounting Research*, 23 (1), 336–350.

Trueman, B., Wong, F. H. M. & Zhang, X. Jun. (2003). Anomalous stock returns around internet firms' earnings announcements, *Journal of Accounting and Economics*, 34, 249–271. doi/10.1016/S0165-4101(02) 00092-7