Stock Price of Firms around Quarterly Earnings Announcements: Do Optioned Firms Perform Differently compared to Non-optioned Firms?

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Abstract

The present paper investigates the beneficial nature of the trading activity in options market and examines whether options enhance the informational efficiency of the underlying asset prices. I conducted an event-study to test the informational efficiency of trading in the optioned firms around the Quarterly Earnings Announcements (QEAs). I compared the information flow from the abnormal returns of the underlying asset prices around the announcements into the market, for the optioned and non-optioned firms. The empirical evidences from this paper showed that the abnormal returns adjust more rapidly for the optioned firms around the QEAs compared to the non-optioned firms. These findings reinforced the hypothesis that the optioned firms disseminate information more quickly (diminishing the impact of QEAs), there by providing new evidences of the beneficial nature of options on the price discovery of the underlying asset prices.

Keywords: Optioned firms, Non-optioned firms, Quarterly earnings announcements, Event-study.

1. Introduction

The information contained in options about the underlying asset returns has gained interest of the searchers for nearly two decades now (Amin & Lee, 1997; Ni, Pan & Poteshman, 2008). If the markets are complete and efficient, then it can be assumed that any (new) information contained in the options is completely worthless for the market participants, since options are derived from its underlying asset. However, if the markets are incomplete, the role of options become more important towards price discovery of the underlying asset prices, as most of the investors prefer to trade in options rather than its underlying asset (Pan & Poteshman, 2006). It happens because options provide a higher financial leverage and lower transaction cost, along with an absence of short-sale restriction to the investors (Mayhew, Sarin & Shastri, 1995; Back, 1993). Also, options allow the investors to trade on the volatility of underlying asset returns. Pan and Poteshman (2006) and Chern, Tandon, Yu, and Webb (2008) further shown that the trading inoptions improves the informational efficiency of the underlying stock market, as the investors possessing private or new information about the future stock returns, prefer to trade in the options compared to directly trading in the stocks. These rationalizing arguments lead us to conclude that accessibility of options trading is imperative to encourage the traders to reveal thier firm-specific information about its underlying asset prices to the market participants for investing. In this research paper, the focus is therefore to study whether options trading enhance the informational efficiency of the underlying asset market.

The existing literature on detecting the informational efficiency of options trading with respect to the underlying stock market has contradicting results. Amin and Lee (1997) show that there is a strong association between options trading and informational efficiency in the market. They also show that a large proportion of long (or short) positions in the options is initiated just before the earnings announcement sand that affects the underlying stock prices. Pan and Poteshman (2006) shown that the equity options with the large volume of trading activity contains information about the future price movements of underlying stock prices. Easley, Hvidkjaer, and O'Hara (2002) study confirms that some investors have private information while trading in the markets, and when these investors trade in the equity market they take risk, because of the(private) information. Also, these investors prefer the options as an instrument for reasons other than just for acting on the private information; such as hedging, better liquidity or ability to trade on the volatility. Chern et al., (2008) find that the announcement of a stock split conveys less new information to the market for a stock that is optioned than for one that is not; there by, indicating that optioned firms have better price efficiency. On similar lines, Skinner (1990) finds a smaller stock price reaction to quarterly earnings news for firms that have listed options than those that do not. Empirical studies indicate

that the stock prices of the firms with options trading react quicker to the QEAs than for the firms without any options trading (Jennings & Stark, 1986; Ho, 1993). Prior researchers suggest that the options market activity discharges a lot of information that is private in nature into the stock market before the QEA and Mergers and Acquisitions (M&A) announcements (Cao, Chen, & Griffin, 2005; Amin & Lee, 1997). Jackwerth (2000) claims that options are non-redundant securities and, in fact, they drive information into the stock prices. Boluch and Chambelain (1997) also suggest that the stock prices are affected by the change in options trading volume.

On the other hand, Bauer, Cosemans, and Eichholtz (2009) show that most of the (non-informed) investors trade in options mainly due to the reasons related to speculation or gambling. This is corroborated with the fact that the traders with information, misuse the improved leverage from the options to speculate and obtain higher returns. Chen, Koutsantony, Truong and Veeraraghavan (2013) document an insignificant relationship between options listings and abnormal returns associated with S&P 500 index inclusions. The results that they obtained questions whether options listings readily enhances the informational efficiency of the underlying equity market. Specifically, as the informed trading is not present in the options market, the listing of options would become meaningless or redundant in increasing the incremental informational efficiency of the underlying equity market. This is in line with Truong and Corrado (2010) who show that options listing alone do not determine the efficiency of the stock price response to earning announcements. Skinner (1990) shows that when the volume of trading is diverted from the underlying stock to the corresponding options, it results in decreased liquidity in the stocks traded, thereby, increasing the volatility of the underlying stock returns.

Gorton and Pennacchi (1993) and Stein (1987) suggest that the informed traders are motivated to trade in the options market rather than trading in the underlying stock market; this migration of the informed traders, also, encourages the migration of uninformed traders to trade in the options. Further more, this release of information by the new traders, results in a destabilizing impact on the prices, and its effect may be strong enough to increase the information asymmetry component of the bid-ask spread of the stock prices, resulting in pricing inefficiency in the market. Mazouz (2004) further shows that this increased spread causes the increase of the bid-ask spread bounce of the stock price; thereby, increasing the volatility of underlying stock returns. Mazouz also shows that the failure to identify the volatility change may cause return dependencies rather than the volume change; these return dependencies would always occur in optioned firms because of the endogenous nature of some news announcements or market-wide or industry-wide conditions. In a similar study to indicate market inefficiencies that may occur because of options, Nofsinger and Prucyk (2003) show that the institutional investors buy after good news and sell after bad news using options; whereas, the individual investors buy after good news but appear to not trade after bad news at all. It causes biases in the market as the institutional investors' trade in large volume using options which is not the case with the individual investors.

Easley, O'Hara, and Srinivas (1998) also provide supporting evidences, claiming that the changes in stock prices lead to the changes in options volume, and there is no information flow from the options trading activity towards the underlying asset returns. However, when they categorise the options trades on the basis of positive and negative news, they find that the stock prices are dependent on the volume of options traded; thereby, indicating that the options cannot be seen as redundant securities. I, there by, find mixed evidences in the literature on the role of options in holding the information that can be transmitted into the stock prices. According to Chakravarty, Guien, and Mayhew (2004), the information contained in the volume of equity options is reflected in its stock prices; therefore, the publicly available information affects the future stock prices allowing the traders to predict the stock returns more precisely. Kothari and Sloan (1992) designs a framework that permits an examination of how well the current stock prices predict the future earnings, and hence, provides a direct impact of trading in options on the stock prices in the equity market. Their framework explains the possible effects of options trading on the price-earnings' lead-lag relationship; that involves the impact of the introduction of options listing, the cross-sectional impact from options listing (firms with readily available options trading versus firms without available options trading) and the impact of options trading volume within a sample of firms with available options trading.

In this paper, to examine if the options provide more informational efficiency to the underlying equity market,

I compare the optioned and non-optioned firms, simultaneously. To analyse this notion of informational efficiency, I turn to conducting an event-study approach by evaluating the effects of Quarterly Earnings Announcements (QEAs) on the optioned firms with respect to the non-optioned firms. I look into whether thefirms with options trading behave differently compared to the firms with no options trading. The premise of the study is; (1) that the options provide means by which more and better (positive and negative) information come into the market, (2) that the stock prices would adjust more quickly to the QEAs, maybe before the earnings announcements also, and (3) that there would be less asymmetry in the information delimited in optioned firms compared to the non-optioned firms.

Amin and Lee (1997) claims that a large amount of new trades are initiated in the options prior to the QEA of a firm. As, the options offer the traders an interpretation of the price discovery of stock and the risk associated with them in the market, options are often a very good predictor of the risks that investors hold because of the underlying assets' future price movements. Many researchers consider the informed traders as an important source of information regarding the returns, risks and sentiments of the trader's stock preferences. When an informed trader trade in the options, the stock prices quickly incorporate any information, there by eliminating the possible arbitrage opportunities. The readiness of options trading is likely to inspire the traders to disclose information about the firms' stock prices for investing in them. Thus, the availability of options trading should reproduce QEA information about the future stock prices of firms with available options trading compared to the firms with no options trading. Therefore, I use an event-study methodology to find if the firms with options trading disseminate both the public and private information about the QEAs into the stock prices, quicker, compared to the firms with no options trading. Altogether, the objective is to show the various distinctive ways in which the trading in options increases the informational efficiency of the underlying asset market. And it is examined by considering the difference in magnitude of the excess abnormal returns surrounding the QEAs for the optioned firms with respect to the non-optioned firms.

2. Data and Sample

In this paper, I use the daily options trading data on the stock and index options published by the National Stock Exchange (NSE), India from 1st January 2009 to 30th April 2014. Since, the larger expiry options are not much traded in the market, the study uses the options data equal to or less than three months to expire. These are the European options and hence no uncertainty is introduced by an early exercise. The data on the prices of stock and index options is collected from the National Stock Exchange (NSE) website. The closing prices are used instead of the bid-ask prices of options, since theyare a more relevant reflection of the current options prices than the bid-ask quotes (Liu, 2007). All the stock options and index options selected for the analysis are traded only on the NSE, and they mature on every last Thursday of the month in which they are due to expire. The daily stock returns data is obtained from the Centre for Monitoring Indian Economy (CMIE)-Prowess 4.14 database. The Prowess database provides data on the QEA dates of individual firms used in the analysis. The dates for a sample of these firms are verified manually by checking the firms' announcement dates from its website separately. The effective announcement dates for a sample of firms is also verified from the NSE, India website. The reasons for any irregularities in the dates are checked through news sources like 'The Economic Times' and 'Money Control'. Subsequently, I combine the firms' options price, stock price and volume data with the QEA dates.

For the event-study, I analyse the QEAs for the firms listed on the CNX500 as on 30th April 2014. I have used a filtering criterion on the CNX500 firms, to only select the firms that are consistently trading on NSE for the past five years from the date 30th April 2014. It is done so that each firm in the analysis would have at least 20 QEAs for analysis. If this filter was not employed, then some biases would occur because of less QEAs analyzed in certain firms and more QEAs analyzed for other firms. It also solves the purpose of standardization of the cross-sectional and time-series data points. And helps in calculating the abnormal returns around the QEA dates. Furthermore, the changes resulting solely due to the QEAs are studied uniformly to avoid any other effects that may contaminate the results. After applying the filters and data cleaning procedures (as stated above), the sample is reduced to 431 firms, out of 500 firms at the beginning. In this sample, 124 firms are optioned, across the time period of analysis and rest of the firms are non-optioned. The control variables data is obtained from the CMIE-Prowess 4.14 database and the Reserve Bank of India (RBI) website. The riskless rate data required comes from the daily listed

closing price of 3-month MIBOR rate available at the RBI website.

3. Effects of the Quarterly Earnings Announcements (QEAs)

The significance of options trading on the underlying asset market is established in the literature, but any generalization as to whether the optioned firms have a better information assimilation and contribute more towards the price discovery compared to the non-optioned firms, needs further consideration (Easley et al., 1998; Pan & Poteshman, 2006). The literature show that the options contribute to the price discovery as they allow the investors to align their strategies with sign and magnitude of their information in a better way compared to the stocks (Johnson & So, 2012). Understanding how and why thetrading in options affect the price discovery differently compared to directly trading in the underlying asset, becomes essential for understanding the impact of external (public) information inflow (for example, earnings announcement).

To compare the optioned and non-optioned firms with each other in regard to better price discovery, I looked for a certain news event that conveys information about the firms' stock prices in the market. I selected the Quarterly Earnings Announcements (QEAs) as the news events to compare their effects on the optioned and non-optioned firms. I used the QEAs for the analysis because they are the regularly publicized announcements, and also because studies in the literature have shown that the significant positive abnormal returns around the periodic news announcements (QEAs) occur that are informative about the firms' stock prices (Ball & Kothari, 1991; Anilowski, Feng, & Skinner, 2007). Cohen, Dey, Lys, and Sunder (2007) show that it happens because the investors holding these securities (around the QEA) must be compensated for the 'disclosure risk' incurred when the valuation relevant information is expected to be released. Campbell, Lettau, Malkiel, and Xu (2001) show that with time there has been an increase in the earnings announcement period return variances. One of the most persistent anomaly found in the literature with respect to the earnings announcement is the post-earnings-announcement drift (Zhang, 2008). Where by the stock prices continue to drift for a long period after the earnings announcement is made. Several factors like the greater news inflow, the increased noise trading, the increased dispersion in analyst forecasts and the uncertainty associated with announcements, contribute towards the increased variances around the QEAs (Campbell et al., 2001; Rajgopal & Venkatachalam, 2005). All these factors are supposed to increase the uncertainty around the QEAs, and are likely to result in the announcement-period premia. This inference is not surprising as an important valuation implications of the earning changes and the rich information set are most of the times accompanied around the QEAs.

In the seminal paper, Kothari and Sloan (1992) using their 'price-earnings relation framework', show that the earnings is an important factor driving the information into the stock prices. They also scrutinize the future earnings predictability fixed in the current stock and options prices, and offer a direct proof that the investors with private-information prefer to trade in the options. In this manner options increase the informational efficiency of the firms' stock prices. Ho (1993) also established a relationship between options trading and underlying stock price response to the QEAs, but on a shorter interval of time. Studies in the literature have also linked the impact of high volume of options traded around the earnings announcement on better price discovery. Amin and Lee (1997) shows that the volume of options traded in the period prior to the QEA is predictive about the succeeding earnings information. Jennings and Starks (1986) show that the underlying stock prices of theoptioned firms adjust more quickly to the QEAs than the prices of the non-optioned firms.

In a comparable research, Roll, Schwartz & Subrahmanyam (2010) identifies that the companies with greater options trading volume have higher values of Tobin-Q, and conclude that the informational efficiency in the equity market is dependent on the options trading. Cao et al., (2005) suggests that the options command disparity in the period prior to the take over announcement, and the traders can forecast the effects of the announcements on the stock prices. If the options trading exposes the informed traders by providing ability to other the traders to trade on the incremental information about the future earnings beyond what is available to the public, then it should also improve the predictions of future earnings. Truong (2012) identifies an inverse relationship between new information disclosed by QEAs and options volume. Now, whether the information efficiency increases with higher volume of options traded, or whether the optioned firms with higher volume of options traded show less excess abnormal

returns close to the QEAs, is beyond the scope of this study. In this study, I restrict myself to address the question; whether being the optioned firm enhances the firms' informative efficiency around the QEA compared to the non-optioned firms.

In this area of research, Holden and Subrahmanyam (1994) claims that when the traders having access to the information (private) trade in the options rather than the stocks, the markets assimilate such information (private) much quickly, and the prices regulate accordingly. If this happens then all the information significant to the QEAs would be integrated into the stock prices in a much faster manner on the date of announcement or even before the date of the announcement. Therefore, for the optioned firms, any (private) information will be unified into the stock pricesin a much faster manner compared to the non-optioned firms. Altogether, as the options trading assimilate the private information about the earnings into the stock prices more quickly, the announcement becomes less important to the market. As a result, the firms having options trading must also exhibit a lesser variance around the announcement dates. The stock prices would regulate more rapidly to the addition of new information from the QEAs because of the firms being optioned. Hence, I propose that, the prices of optioned firms adjust quicker to the earnings announcements than the non-optioned firms; and the options market enhances the efficiency of the underlying equity market. To study this premise, I devise an event-study methodology to study the abnormal returns around the QEAs for the firms that are optioned compared to the firms that are non-optioned; and address the following question:

- *Do the stock prices of optioned firms adjust more rapidly to the QEAs compared to the non-optioned firms*

4. Methodology and Research Design

I examine the empirical question as to whether the abnormal stock returns of the firms that are optioned adjust quicker to the QEA than that of the non-optioned firms. Specifically, I examine the excess abnormal returns close to the announcement and check whether they are statistically different from zero. A similar methodology is used in Chen et al., (2013) for studying the impact of index inclusion on optioned and non-optioned firms. Chern et al., (2008) also used abnormal returns to study stock splits announcements. For the analysis, the trading day of the event of the QEA occurring is set as 0. I calculate the expected return as the average of the returns in the day sin terval ("64, "15) prior to the QEA, to determine the pre-earnings announcement expected returns on the event day 0. It is required that a firm must have data for more than 90 days prior to the QEA. is the return of the firm i for the day t between "14 to "1 days before the QEA. Pre-earnings announcement abnormal returns for each day t before the z QEA of the stock i on the event day t is defined as:

$$Prer_{izt} = r_{izt} - \mathrm{E}[r_{izt}]$$

$ApreR_{iz}$ represents the cumulative average pre-earnings announcement abnormal return of a stock for a particular QEA z for the event period from "14 to "1 days. It is the equally weighted arithmetic mean of the abnormal returns where n is the number of days during this period:

$$ApreR_{iz} = \frac{1}{n}\sum_{t=-1}^{-14} Prer_{izt}$$

I estimate the expected return as the average of returns in the days interval (+7, +20) post QEA to determine the post-earnings announcement expected return on the event day 0. is the return of the firm i for the day t between +1 to +6 days after the QEA. represents the post-earnings announcement abnormal returns for each day t after the z QEA of the stock i on the event day t and is defined as:

$$Postr_{izt} = r'_{izt} - \mathrm{E}[r'_{izt}]$$

$ApostR_{iz}$ represents the cumulative average post-earnings announcement abnormal return of a stock for a particular QEA z for the event period from +1 to +6 days. It is the equally weighted arithmetic mean of the abnormal returns where m is the number of days during this period:

$$ApostR_{iz} = \frac{1}{m}\sum_{t=1}^{6} Postr_{izt}$$

EAR_{iz} represents the excess abnormal return of stock i for a particular QEA z, and is calculated by subtracting the cumulative average post-earnings announcement abnormal return and the cumulative average pre-earnings announcement abnormal return:

$$EAR_{iz} = [ApostR_{iz} - ApreR_{iz}]$$

EAR_i representst he cumulative average excess abnormal return of a stock i for Z number of QEAs in our data sample period is:

$$EAR_i = \frac{1}{Z}\sum_{z=1}^{Z} EAR_{iz}$$

I also perform the robustness check by constructing a market model for calculating excess returns with respect to the market for all the firms using the Capital Asset Pricing Model (CAPM). r_{izt}^{m} is the return of thefirm *i* for the day *t* between "20 to +20 days for the announcement made on day 0 for the QEA *z* and is calculated using:

$$r_{izt}^{m} = r_{ft} + \beta_{it}\left[r_{mt} - r_{ft}\right]$$

where, r_{ft} is the daily risk-free rate at the time *t* calculated usingthe 3-month MIBOR rate. r_{mt} is the daily return at thetime *t* calculated using the closing price of NSE Nifty50 index and β_{it} is the beta of the stock *i* atthe time *t*. represents the cumulative average abnormal returns for each day *t* for the firm *z* QEA of stock *i* between the period from "20 to +20 days, is defined as:

$$C\_R_{izt} = r_{izt} - r_{izt}^{m}$$

$ApreR\_market_{iz}$ represents the cumulative average pre-earnings announcement abnormal return of a stock *i* for a particular QEA *z* for the event period from "20 to "1 days. It is the equally weighted arithmetic average of the abnormal returns where *p* is the number of days during this period:

$$ApreR\_market_{iz} = \frac{1}{p}\sum_{t=-1}^{-20} C\_R_{izt}$$

$ApostR\_market_{iz}$ represents the cumulative average post-earnings announcement abnormal return of a stock *i* for a particular QEA *z* for the event period from +1 to +20 days is the equally weighted arithmetic average of the abnormal returns where *q* is the number of days during this period:

$$ApostR\_market_{iz} = \frac{1}{q}\sum_{t=1}^{20} C\_R_{izt}$$

EAR_market_{iz} represents the excess abnormal return with respect to the market model of a stock *i* for a particular QEA *z* is calculated by subtracting the cumulative average post-earnings announcement abnormal return and the cumulative average pre-earnings announcement abnormal return:

$$EAR\_market_{iz} = [\,ApostR\_market_{iz} - ApreR\_market_{iz}]$$

represents the cumulative average excess abnormal return with respect to the market model of a stock *i* for QEA, *Z* in our data sample period is defined as:

$$EAR\_market_i = \frac{1}{Z}\sum_{z=1}^{Z} EAR\_market_{iz}$$

Based on Lynch and Mendenhall (1997), I scrutinize the relationship between abnormal returns around QEAs and abnormal return surrounding QEAs using the cumulative average excess abnormal returns. The regression model is as follow:

$$EAR_i = \alpha + \beta\ OPT_i + \sum \gamma(\text{Control}) + \varepsilon \quad (1)$$

$$EAR\_market_i = \alpha + \beta\ OPT_i + \sum \gamma(\text{Control}) + \varepsilon \quad (2)$$

Where, and are the dependent variables, defined as the difference between abnormal returns post-announcement and abnormal returns pre-announcement. To check whether the QEAs effects are different for the optioned and non-optioned firms, I use a dummy variable which takes the value 1 for the optioned firm and 0 for the non-optioned firms. If the coefficient of the *OPT* variable is significant, it shows that the optioned firms behave differently around the QEAs with respect to the non-optioned firms. If the abnormal returns before the announcement are negative (positive) for the optioned firms then the sign of the coefficient of OPT variable must be positive (negative), to implicate that being optioned improves the price discovery of the asset prices around the QEAs; otherwise, being optioned would not have any significant impact on the price discovery. And if this condition of signs is met, it would signify that the abnormal returns for the optioned firms enhances the informational efficiency of the market. In this study I have used parametric t-test when the cross-sectional mean of abnormal returns is calculated. Saens and Sandoval (2005) show that although individual stock returns and stock abnormal returns are evidently non-normal; but, whenever daily returns are used on the large sample size, the cross-sectional mean abnormal returns converge to normality. Therefore, first in this section, I will analyse the daily excess abnormal returns produced around the QEAs separately for the optioned firms and thenon-optioned firms, and then I will conduct the regression analysis to compare the optioned and non-optioned firms.

4.1. Control Variables

A comparison of the underlying asset returns between the optioned and non-optioned firms, ignores the possibility of a systemic difference between the firms and the abnormal returns around the QEAs. Therefore, I included the following control variables to regulate other factors that might affect the deviations in the abnormal returns:(1) Market capitalization (*Market Cap*) as a proxy for the firms' size, as the bigger firms have a better information environment (Chen et al., 2013). (2) *BV/MV* as the ratio of the book value of asset to the market value of asset at the end of each fiscal year. Firms with a high ratios of Book to Market value (*BV/MV*) have a greater average returns compared to firms with a low value of the ratio (Fama& French, 1992). (3) Firms' stock trading volume (*Share Traded*)as a proxy for thetrading costs and liquidity. It is calculated as the logarithm of the ratio of volume of stocks traded 21 days before the QEA, over the mean trading volume between event days "100 and "21, as more liquid stocks have a better organized information regularity (Chern et al., 2008). (4) Firms' beta (*Beta*) as a proxy of thefirms'market risk. Amihud and Mendelson (1989) shows that the expected returns of firms is an increasing function of the systematic beta risk. (5) Idiosyncratic volatility (*Volatility*) as a measure of therisk associated with a firms' stock price around the earnings announcement. Volatility is defined as thenatural logarithm of theratio of high over low value of the stock price on any particular day. Wurgler and Zhuravskaya (2002) shows that the firms with a higher idiosyncratic volatility would be less attractive to the traders with some private information, and hence the information in these firms move slowly. Therefore, arbitrageurs are more likely to take a smaller positions in the stocks with high volatility around the QEAs. (6) And the variable is the ratio of the cumulative average stock trading volume post-announcement from event days +6 to +20 after the QEA (to the cumulative average stocks trading volume pre-announcement from event days -15 to -64 days before the QEA). It signifies the relative trading happening in the firms' post-announcement period with respect to pre-announcement period, and is represented as:

$$ShrRatio_i = \frac{PostVol_{(+6,+20)}}{PreVol_{(-64,-15)}}$$

4.2 Sample Summary and Descriptive Statistics

The Panel A of Table-1 showsthe size of the final dataset obtained after applying several filtering criteria to the firms in the CNX500 index, listed on NSE. The dataset comprises of 431 firms in the time period from 1st January 2009 to 30th April 2014. Out of these firms, 124 firms are optioned and 307 firms are non-optioned. All these firms were constantly listed on the CNX500 indexduring the period in analysis, and any new firm included or excluded from the indexduring this period are excluded from the analysis. Firms that are being acquired by other firms during this time period are also excluded. The Panel B of Table-1 provides the summary statistics of the independent variables used in the final dataset of the regression analysis for the optioned and non-optioned firms. It can be seen that there is a major difference between the market capitalization and the shares traded between the optioned and non-optioned firms. Optioned firms mostly represent the large firms in the Indian market. Although, the mean beta for both the optioned and non-optioned firms is similar, close to 1; the optioned firms are roughly half as volatile compared to the non-optioned firms. Also, the book-to-market ratio for the optioned firms is 20% lesser compared to the non-optioned firms. It implies that the non-optioned firms tend to have a higher growth potential for the investors, but investing in these firms comes with a higher risk element. The control variable *ShrRatio*, is roughly half for the optioned firms with respect to the non-optioned firms. It shows that more trading happens in the non-optioned firms after the announcement; whereas, the trading in optioned firms is more prominent before the announcement. There fore, the results from summary statistics suggest that the non-optioned firms are smaller and more volatile with a higher growth potential compared to the optioned firms.

4.3 Analysis of the Average Abnormal Returns around the QEAs

The Table-2 reports the daily average abnormal returns and cumulative average abnormal returns (CAR) from -14 days prior to the QEA to +6 days after the QEA. The abnormal returns are averaged across all the QEAs for the optioned and non-optioned firms separately for comparison. I examine whether the firms experience positive/negative average abnormal returns around the QEAs. For the pre-announcement period, I find that on any day when the t-stat of average abnormal returns is significant, the returns are on the negative side for both the optioned and non-optioned firms. It implies that on the days prior to the QEAs (-14 to -1 days), the investors are pessimistic and hold bearish sentiments about the

nature of the earning announcements. The average abnormal returns are significant and negative only on one (third) day in the post-announcement period for the optioned firms. And for the non-optioned firms, they are significant and negative on three (first, third and sixth) days in the post-announcement period. Further analysis is needed to make any conclusions on why the average abnormal returns are not significant on most of the days after the announcement.

Although, one result is prominent that the total cumulative average abnormal returns in the complete period of analysis (21 days) is almost equal for both the optioned (-2.331%) and non-optioned firms (-2.342%). But, the cumulative average abnormal returns on just one day (day -1 pre-announcement) before the QEA is -2.083% for the optioned firms and -1.586% for the non-optioned firms. Therefore, the cumulative average abnormal returns are more negative for the optioned firms compared to the non-optioned firms just before the announcement; but, after some (+6) days of the announcement the cumulative average (Table 1) abnormal returns becomes almost equal for both the categories of the firms. One of the implication of the average abnormal returns for the optioned firms being lesser than that the non-optioned firms is; investors expect even worse results for the optioned firms compared to the non-optioned firms. And by trading in the optioned firms they trade on their expectation of the negative returns before the QEAs. Other important implication is; through options investors with the private information about the QEAs act on their information (private) and disseminate that information into the market just before the QEAs.

The Figure-1 presents the graph of the cumulative average abnormal returns for both the optioned and non-optioned firms around the QEAs, separately. It also shows that the cumulative average abnormal returns graph is negatively sloped around the QEAs. The Figure-2 presents the graph of standard deviation of the returns around the QEAs. The standard deviation increases by around 1% for both the optioned and non-optioned firms on the announcement date with respect to the other days around the announcement. Also, it can be seen that the standard

Table 1: General Statistics

(A) Data sample used for the Analysis of thefirms' Quarterly Earnings Announcements (QEA)

Time period of analysis	1st January 2009-30th April 2014
Total number of days in the time-period	1324
Total number of firms selected	431
Optioned firms	124
Total Number of Earning Announcements	8974
Analysis using 'OptVol' Performed for firms	**39**

(B) Summary statistics of the Optioned and Non-optioned firms

Optioned firms
Number of observations: 124

Stats	ShrRatio	BV/MV	Beta	Market Cap	Share Traded	Volatility
Mean	0.20	0.51	1.07	3,88,467	28,35,637	28.95
StdDev	0.43	0.38	0.39	5,37,577	39,16,933	12.06
Minimum	-0.13	0.04	0.23	20,821	11,151	10.15
Maximum	3.52	1.72	2.28	29,59,739	3,09,54,274	74.41
Skewness	5.18	1.17	0.45	3	4	1.04
Kurtosis	33.31	0.72	0.36	9	23	1.44

Non-optioned firms
Number of observations: 307

Stats	ShrRatio	BV/MV	Beta	Market Cap	Share Traded	Volatility
Mean	0.42	0.64	1.08	32,519	5,80,700	51.82
StdDev	0.62	0.45	0.38	36,932	14,12,365	68.81
Minimum	-0.29	0.01	0.28	2,985	902	12.54
Maximum	4.82	2.56	2.07	2,71,953	1,52,42,973	116.78
Skewness	3.26	1.18	0.24	3	6	8.11
Kurtosis	16.13	1.75	-0.21	10	50	79.68

Note: In Panel A of this Table, I show the number of firms and data points (QEAs) in the analysis during the specified time period. In Panel B, I report the results of the optioned and non-optioned firms separately. *ShrRatio*is the variable demonstrating the firms' average abnormal trading volume. It is the ratio of the average stock trading happening post-earnings announcement on days between +7 to +20 and the average stock trading happening pre-earnings announcement on days between "64 to -15. Other control variables that are used in the regression analysis are; market capitalization (*Market Cap*), stock trading volume (*Share Traded*), book to market ratio (*BV/MV*), idiosyncratic volatility (*Volatility*) and firms' beta (*Beta*).

deviation of the non-optioned firms is higher compared to the optioned firms, on the day of the announcement. These findings are consistent with the literature that the optioned firms are less volatile around the QEAs. TheTable-3 presents the cumulative average abnormal returns around the QEAs fora diverse set of event windows, viz. ("1,1), ("14,-1), ("1,6), (1,6) and (-14,6). Percentage returns, as shown in the Table-3 are the average abnormal returns for the days specified in the interval.The firms are categorizedas optioned and non-optioned in a similar manner, as in the earlier Table-2. This Table shows that surrounding the QEAs, the cumulative average abnormal returns are negative and statistically significant at up to 5% level for all theevent windows, except for the interval (+1, +6)consisting of the optioned firms. The average abnormal returns in the interval(-14, -1) is -0.148% for the optioned firms and -0.112% for the non-optioned firms. This result further enhances the result concluded earlier, that the average abnormal returns before the announcement for the optioned firms is more negative than the non-optioned firms.

Another important result from Table-3 is that the average abnormal returns in the interval(-1, +1) is twice more negative for the optioned firms compared to the non-optioned firms. This is an important conclusion that shows greater abnormal returns occurin the optioned firms close to and before the QEAs. It implies that the optioned firms generate more informational efficiency into the market; as the trading in them occurs close to the announcements and any new information from the QEAs get disseminated into the stock prices more quickly than the non-optioned firms. One result is clear that the investors trade post-announcement in the non-optioned firms and

they trade very close to the announcement for the optioned firms. Therefore, the reason why the optioned firms attain better informational efficiency, is that right after the QEAs, investors' trade in the firms that are optioned and information quickly gets disseminated into the market. The best strategy for the investors is to go short on the optioned firms before the announcement in the interval (-14, +1) realizing average positive returns of +0.148%, and going short onthe non-optioned firms after the announcement realizing average positive returns of +0.122%. In the next section, I further analyse this result using the different measure of calculating the average abnormal returns (Table 2).

Table 2: Analysis of the Average Abnormal Returns Around the Quarterly Earnings Announcement (QEA) with Respect to the Past Stock Returns: Optioned Vs Non-optioned stocks

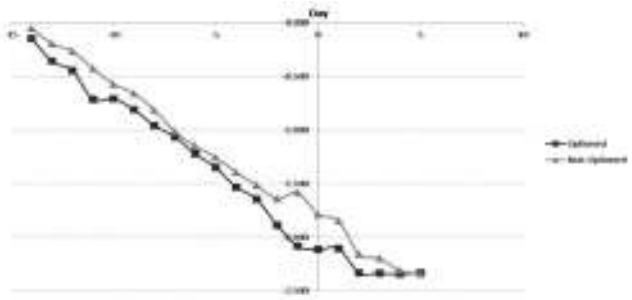
Day	Optioned			Non-optioned		
	AR	t-Stat	CAR	AR	t-Stat	CAR
-14	-0.145 **	-2.767	-0.145	-0.050	-1.323	-0.050
-13	-0.213 **	-3.228	-0.359	-0.144 **	-3.443	-0.194
-12	-0.088	-1.243	-0.447	-0.072 **	-1.688	-0.265
-11	-0.268 **	-4.006	-0.714	-0.161 **	-3.799	-0.426
-10	0.005	0.081	-0.706	-0.143 **	-3.529	-0.569
-9	-0.101	-1.591	-0.810	-0.089 **	-2.041	-0.658
-8	-0.150 **	-2.783	-0.960	-0.154 **	-4.018	-0.812
-7	-0.103 **	-1.873	-1.063	-0.204 **	-5.650	-1.016
-6	-0.160 **	-2.690	-1.223	-0.135 **	-3.076	-1.150
-5	-0.128	-1.578	-1.351	-0.108 **	-2.306	-1.258
-4	-0.182 **	-2.632	-1.534	-0.136 **	-3.051	-1.394
-3	-0.114 **	-1.695	-1.647	-0.124	-2.757	-1.517
-2	-0.241 **	-3.740	-1.888	-0.123 **	-2.731	-1.586
-1	-0.195 **	-2.929	-2.083	0.054	1.210	-1.586
-	NA	NA	NA	NA	NA	NA
1	-0.031	-0.375	-2.114	-0.200 **	-3.575	-1.786
2	0.008	0.096	-2.106	-0.063	-1.027	-1.849
3	-0.225 **	-2.896	-2.331	-0.311 **	-6.143	-2.160
4	-0.007	-0.096	-2.338	-0.041	-0.894	-2.200
5	-0.008	-0.125	-2.346	-0.112 **	-2.456	-2.313
6	0.015	0.254	-2.331	-0.029	-0.716	-2.342

Note: In this Table, I present the event day average abnormal returns of the QEA spanning the period from the year 2009 to 2014 for all the optioned and non-optioned firms. The daily average abnormal return during the pre-earnings announcement days onthe day t (where t = -14 to -1) is the difference between the actual return on the day and the expected return from the days between -64 to -15. The daily average abnormal return during the post-earnings announcement days onthe day t (where t = +1 to +6) is the difference between the actual return on the day and the expected return from the days between +7 to +20. The NSE Nifty50 value-weighted return index, is a proxy for the market return index.

* Statistical significance at the 10% level.

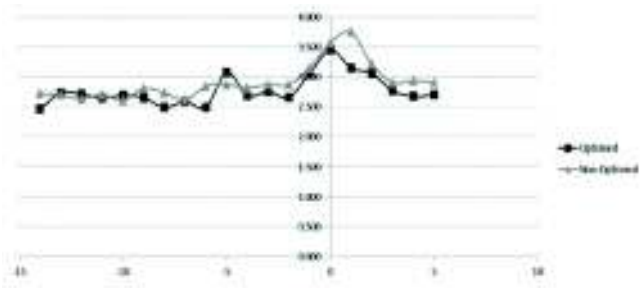
** Statistical significance at the 5% level.

Figure 1: Cumulative Average Abnormal Returns with respect to the Firms' Past Returns Surrounding the Earnings announcement Day for the Optioned Vs Non-optioned Firms.



Note: In this graph, the cumulative average abnormal returns for the optioned and non-optioned firms are plotted against the days around the QEA. The QEA is announced on day 0.

Figure 2: The Standard Deviation of Returns with respect to the Firms' Past Returns Surrounding the Earnings Announcement Day for the Optioned Vs Non-optioned Firms.



Note: In this graph, the standard deviation of returns for the optioned and non-optioned firms are plotted against the days around the QEA. The QEA is announced on day 0.

Table 3: Analysis of the Averag Abnormal Returns Aroundthe Quarterly Earnings Announcement (QEA) for various event windows with respect to the Past Stock Returns: Optioned vs Non-optioned stocks

Number of firms	Optioned firms (124)	Non-optioned firms (307)
CAR (-1,1)	-0.121 **	-0.059 *
	(-2.322)	(-1.710)
CAR (-14,-1)	-0.148 **	-0.112 *
	(-8.710)	(-9.961)
CAR (-1,6)	-0.065 **	-0.093 *
	(-2.414)	(-5.048)
CAR (1,6)	-0.038 **	-0.122 *
	(-1.287)	(-6.046)
CAR (-14,6)	-0.116 **	-0.115 *
	(-7.871)	(-9.604)

Note: In this Table, I present the cumulative average abnormal returns during earnings announcements for various event windows. The *CARs* are presented for the optioned and non-optioned firms spanning the period from the year 2009 to 2014. The daily average abnormal return during the pre-earnings announcement days on the day t (where t = -14 to -1) is the difference between the actual return on the day and the expected return from the days between -64 to -15. The daily average abnormal return during the post-earnings announcement days on day t (where t = +1 to +6) is the difference between the actual return on the day and the expected return from the days between +7 to +20. The Nifty50 value-weighted return index, is a proxy for the market return index.
* Statistical significance at the 10% level.
** Statistical significance at the 5% level.

4.4 Robustness Check: Analysis of the Average Abnormal Returns (with respect to the Market) Around the QEAs

I checked for the robustness of this procedure by comparing the average abnormal returns of the optioned and non-optioned firms in this section. I performed a similar analysis as in the previous section by calculating the average abnormal returns for the firms using a different methodology that is with respect to the market CAPM. In this method the daily average abnormal returns for the

firms is calculated using the beta of the firm and the Nifty50 index (proxy for market) returns.

The Table-4 summarizes the results around the QEAs for -20 days pre-announcement to +20 days post-

Table 4: Analysis of the Average Abnormal Returns Around the Quarterly Earnings Announcement (QEA) with respect to the Market Returns: Optioned Vs Non-optioned stocks

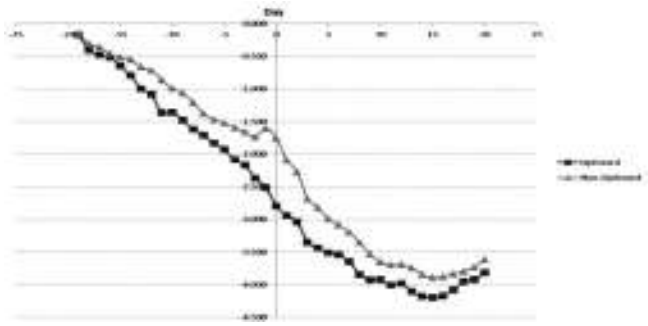
Day	Optioned			Non-optioned		
	AR	t-Stat	CAR	AR	t-Stat	CAR
-20	-0.049	-0.933	-0.049	-0.051	-0.857	-0.051
-19	-0.120 *	-1.757	-0.169	-0.102 **	-2.397	-0.153
-18	-0.234 **	-3.550	-0.403	-0.154 **	-3.732	-0.306
-17	-0.074	-1.158	-0.477	-0.054	-1.360	-0.361
-16	-0.038	-0.629	-0.514	-0.092 **	-2.129	-0.453
-15	-0.127 **	-2.284	-0.641	-0.064 *	-1.691	-0.517
-14	-0.152 **	-2.973	-0.793	-0.032	-0.873	-0.549
-13	-0.204 **	-3.166	-0.998	-0.112 **	-2.808	-0.662
-12	-0.087	-1.271	-1.085	-0.058	-1.408	-0.719
-11	-0.283 **	-4.312	-1.368	-0.147 **	-3.594	-0.866
-10	-0.005	0.072	-1.363	-0.125 **	-3.192	-0.991
-9	-0.116 **	-1.884	-1.479	-0.074 *	-1.753	-1.064
-8	-0.141 **	-2.623	-1.620	-0.143 **	-3.850	-1.208
-7	-0.088 *	-1.635	-1.708	-0.173 **	-4.982	-1.381
-6	-0.126	-2.151	-1.833	-0.089 **	-2.092	-1.470
-5	-0.096	-1.203	-1.929	-0.047	-1-062	-1.517
-4	-0.156 **	-2.299	-2.085	-0.076 *	-1.780	-1.593
-3	-0.086	-1.320	-2.170	-0.070	-1.639	-1.663
-2	-0.203 **	-3.178	-2.374	-0.070	-1.622	-1.734
-1	-0.141 **	-3.669	-2.515	-0.127 **	2.952	-1.607
-	-0.277 **	-3.673	-2.791	-0.146 **	-2.851	-1.753
1	-0.150 *	-1.857	-2.941	-0.338 **	-6.234	-2.091
2	-0096	-1.154	-3.037	-0.180 **	-3.044	-2.271
3	-0.312 **	-4.131	-3.349	-0.413 **	-8.591	-2.685
4	-0.089	-1.369	-3.438	-0.134 **	-3.108	-2.818
5	-0.073	-1.189	-3.511	-0.173 **	-3.993	-2.991
6	-0.032	-0.560	-3.543	-0.093 **	-2.420	-3.084
7	-0.103 **	-1.901	-3.646	-0.115 **	-1.992	-3.200
8	-0.199 **	-3.408	-3.845	-0.149 **	-3.712	-3.349
9	-0.083	-1.238	-3.928	-0.182 **	-4.242	-3.531
10	0.004	0.055	-3.924	-0.119	-2.832	-3.650
11	-0.086	-1.432	-4.010	-0.045	-1.075	-3.696
12	0.026	0.433	-3.984	0.004	0.102	-3.691
13	-0.124 **	-2.323	-4.108	-0.053	-1.408	-3.744
14	-0.072	-1.294	-4.179	-0.097 **	-2.610	-3.841
15	-0.015	-0.255	-4.195	-0.050	-1.198	-3.890
16	0.023	0.342	-4.171	0.014	0.313	-3.877
17	0.092	1.327	-4.079	0.042	1.029	-3.834
18	0.126 *	1.878	-3.954	0.038	0.894	-3.796
19	0.030	0.453	-3.923	0.066	1.533	-3.730
20	0.104 *	1.845	-3.819	0.116 **	3.090	-3.614

Note: In this Table, I present the event day average abnormal returns of the QEAs spanning the period from the year 2009 to 2014 for the optioned and non-optioned firms. The daily average abnormal return on theday t (where t = "20 to +20) is the difference between the actual return on the day and the expected return from the market model. The Nifty50 value-weighted return index is a proxy for the market return index.

* Statistical significance at the 10% level.

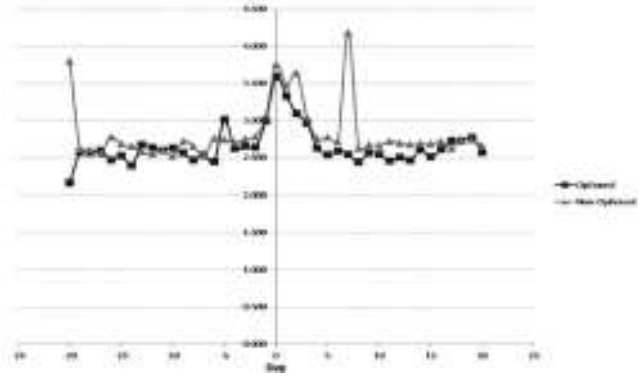
** Statistical significance at the 5% level.

Figure 3: Cumulative Average Abnormal Returns with respect to the Market Model SurroundingtheEarnings Announcement Day for theOptioned Vs Non-optioned Firms



Note: In this graph, the cumulative average abnormal returns for the optioned and non-optioned firms are plotted against thedays around the QEA. The QEA is announced on day 0.

Figure 4: Standard Deviation of the Returns with respect to the Market Model Surrounding the Earnings Announcement Day for the Optione Non-optioned Firms



Note: In this graph, standard deviation of returns for optioned and non-optioned firms are plotted against days around QEA. QEA is announced on day 0.

Table 5: Analysis of the Average Abnormal Returns Aroundthe Quarterly Earnings Announcement (QEA) for Various Event Windows with respect to the Market Returns: Optioned Vs Non-optioned stocks

Number of firms	Optioned firms (124)	Non-optioned firms (307)
CAR (-1,1)	-0.121 **	-0.059 *
	(-2.322)	(-1.710)
CAR (-14,-1)	-0.148 **	-0.112 *
	(-8.710)	(-9.961)
CAR (-1,6)	-0.065 **	-0.093 *
	(-2.414)	(-5.048)
CAR (1,6)	-0.038 **	-0.122 *
	(-1.287)	(-6.046)
CAR (-14,6)	-0.116 **	-0.115 *
	(-7.871)	(-9.604)

Note: In this Table, I present the daily average values of the cumulative average abnormal returns aroundtheearnings announcements for various event windows. The *CAR_market* iscalculated for theoptioned and non-optioned firms spanning the period from the year 2009 to 2014. The daily average abnormal return on the day *t* (where t = "20 to +20) is the difference between the actual return on the day and the expected return from the market model. The Nifty50 value weighted return index, is a proxy for the market return index.
* Statistical significance at the 10% level.
** Statistical significance at the 5% level.

announcement. In this analysis I have considered more number of days after the announcement, to check for thenature of returns occurring some days after the announcement. Most of the conclusions made from this Table (Table-4) are similar in nature to the results obtained in theTable-2. This Table further enhances the results of previous analysis that thereturns on most of the days around the QEAs are negative, implying bearish sentiments of theinvestors about theearnings announcements. It signifies that the procedure of analysing the average abnormal returns is robust, and does not depend on the methodology used to calculate the average abnormal returns.

One important finding from this analysis is that the returns after +15 days of the QEAs, are positive. This is true for both the optioned and non-optioned firms. It implies that the investors' sentiments changes after two weeks of the announcements and the firms' returns begin to become positive. The same can also be seen in the Figure-3. This also implies that the negative returns because of the QEAs are not permanent, and the stock prices would head back to the normal levels after some days of the announcement. The results implied by the Figure-4 and the Table-5 are similar in lines with the results obtained from the Figure-2 and the Table-3, respectively. Results in both these parts implies that there exist significant negative average abnormal returns around the QEAs for both the optioned and non-optioned firms. These negative returns are situated in the pre-announcement or on the announcement date for the optioned firms compared to the non-optioned firms. For the non-optioned firms the returns are mostly situated in the post-announcement period. Although in this analysis I have not compared the optioned and non-optioned firms simultaneously, which is essential for establishing the benefits of firms being optioned. Therefore, in the next section I examined, whether and how the optioned firms differ from the non-optioned firms using the regression analysis with respect to the excess average abnormal returns.

4.5 Regression Analysis Results

The Table-6 reports the results of the OLS regressions based on the firms' stock price response to the QEAs. The dependent variables of the two regression models used for the analysis are; the excess average abnormal returns (*EAR*) and the excess average abnormal returns with respect to the market (*EAR_market*). The binary variable *OPT* equals one for the optioned firms and zero for the non-optioned firms at the time of the announcement. It is done to examine the effect of firms being optioned or non-optioned on the excess average abnormal returns noticed around the QEAs, as shown in the earlier Tables, from Table-2 to Table-5. I include the control variables, namely, *Market Cap*, *BV/MV*, *Share Traded*, *Volatility*, *ShrRatio* and *Beta*. The F-statistic and p-value of the first regression model is significant at up to 5% level, but the value is less (3.3%). I find that the *OPT* binary variable is positive and significant at up to 10% level with respect to the dependent variable *EAR*. The coefficient of *OPT* is 0.1126 indicating a significant difference in the stock price response between the optioned and non-optioned firms around the QEAs. The excess average abnormal returns for the optioned firms right after the QEA is positive and higher than the non-optioned firms. This shows that the positive information from the QEAs gets dissimilated into the market more rapidly for the optioned firms. It implies that the investors with (private) information about the QEAs trade on the optioned firms and disseminate the information into the asset prices.

The results conclude that the excess average abnormal return surrounding the QEAs are significantly different for both the categories of firms, but what is interesting, is the positive loading on it. Positive loading on the coefficient of the *OPT* variable implies that for the optioned firms the pre-announcement negative returns as observed inTable-2 and Table-3 are lesser, and are being adjusted with more positive returns in the post-announcement period. It implies that the investors have negative expectations about the QEAs, but once the announcements are made, the investors' sentiments improve about the optioned firms. The second regression model also shows similar results, the *OPT* binary variable is also positive and significant at up to 10% level, with respect to the dependent variable *EAR_market*. The coefficient of the *OPT* variable is 0.0819 and significant at up to 10% level, confirming that the price discovery in the optioned firms is different from that of the non-optioned firms. It further shows that the optioned firms increases the informational efficiency of the stock market, since all the positive information ofthe QEAs gets rapidly disseminated into the asset prices. The control variables *Beta*, *Volatility*, *Market cap*, *Shares traded* and *BV/MV*, load in significantly on the *EAR*and *EAR_Market* for both the regression equations, whereas, the variable *ShrRatio* is negative and significant at up to 10% level for the first equation. It indicates that the stock price response of the announcement is higher for thefirms during this event window with a large abnormal share trading volume in the post-announcement period.

On the similar area of study, the literature has varied results; some studies differ from this result completely, as, Skinner (1990) shows that the presence of the options trading significantly decreases the stock price response to the earnings information. On the other hand, Truong and Corrado (2010) show that the trading activity in thefirms with available options trading vary significantly with respect to the private information, and the number of

informed traders acting on it. They show that thefirms with options trading have greater information content conveyed into the stock prices just before the QEAs, consequently reducing the contemporaneous stock price response to the announcements. It is consistent with the high stock prices of optioned firms, and there fore shows that only a part of the information is ultimately released in the QEAs (Truong and Corrado, 2010).

The results from the Table-2 to Table-6 shows that around the announcement period, the average abnormal returns for the optioned firms are negative and more in magnitude before the announcement compared to the average abnormal returns after the announcement. That is different from that of the non-optioned firms, for whom the average abnormal returns are negative and more in magnitude after the announcement. And the results from theTable-6 implies that during the earnings announcements, the difference between the post and pre announcement average abnormal returns for the optioned firms is positive, and significantly different from the non-optioned firms. Both these results are synchronous with each other and implies that the average abnormal returns for the optioned firms are more pre-announcement and take lesser time to disseminate than the non-optioned firms. It further implies that the options investors take advantage of the options market to act on the earnings information, inducing a faster price discovery of asset. And they exploit the (private) information more rapidly compared to the non-optioned stocks investors. Overall, the results from theTable-2 toTable-6 conclude that the options trading places measurable impact on the stock price response to the QEAs, and in total, the optioned firms contributes to lower eccentric announcement effects. In this manner thefirms that are optioned, enhances the informational efficiency of the underlying asset prices.

Through this study, I contribute towards settling the difference of arguments with respect to the role of options in establishing price and informational efficiency in the underlying equity market. The results obtained for the emerging (Indian) options markets answers intriguing question not only for the academicians, but also for the policy makers and practitioners. The results show that it makes little sense for the investors to trade on any news announcements for the firms that are optioned, as their stock prices have already factored in the announcement surprise. In fact for trading on any news announcements, investors are better in trading non-optioned firms only. An important inference for the policy makers from this study is with respect to the diversion of the volume of trading from the underlying stock to the corresponding options, which results in a decreased liquidity in the underlying stocks traded, there by increasing the volatility of underlying stock returns. There fore, when some news announcement or macroeconomic event affects the stock prices of firms, policymakers might want to regulate the trading accordingly in both stocks and options to keep a check on the volatility in the underlying stock returns. The concentration of informed traders is problematic for other individual investors in the market; and it provides potential rationales for the policymakers to monitor the trades in stock and options markets, simultaneously. Individual investors in the Indian market might justwant to trade in the index options; as trading in them is not driven by non-public information, making it an ideal segment for the investors to invest their money.

This study has some limitations that might lead to implications for the future researches. First, as the measures used to represent the options trading volume in this study does not categorise themoneyness of options contracts;moneyness that could facilitate more informed trading is not highlighted. Researchers can identify the types of options contracts (OTM, ATM or ITM options) that are more likely to be associated with informed trading. Second, the study does not comment on the type of earnings relevant information (accounting variables) that gets impounded into the stock prices through options trading. Also, the effects of any other announcements or information that might have been floated in the market just near the QEAs, are not factored in the analysis. Third, future researchers may incorporate industry effect while studying the differences between optioned and non-optioned firms, as the abnormal returns may also be dependent on the industry of a particular firm. Fourth, the event study analysis could retrieve very reliable information about the optioned and non-optioned firms for comparison using the tick-by-tick data around the QEAs. (Table 6)

5. Conclusion

This research article shows that options enhance the informational efficiency of the underlying asset prices by contributing towards its price discovery. An event-study approach around the QEAs is used to examine whether the optioned firms have better information assimilation and contribute more towards theprice discovery compared

Table 6: Cumulative Average Excess Abnormal Return for 431 Firms with 124 Optioned Firms

	OPT	ShrRatio	BV / MV	Beta	Market Cap	Share Traded	Volatility	Constant	Adj. R^2	F-stat	Durbin Watson	BPG test Statistic
EAR	0.1126**	-0.1051**	-0.0175	-0.0649	-0.0237	0.0022	-0.0005	0.0996	0.033	2.090**	2.18	3.540**
	(0.0564)	(0.0372)	(0.0610)	(0.0786)	(0.0698)	(0.0118)	(0.0024)	(0.0797)				
EAR_Market	0.0819**	-0.0349	0.0434	0.0409	-0.0176	0.0065	-0.0001	-0.0758	0.050	3.184**	2.02	5.490**
	(0.0353)	(0.0238)	(0.0396)	(0.0505)	(0.0326)	(0.0066)	(0.0010)	(0.0471)				

Note: In this Table, I summarizethe results of regressions analysis around the QEA day of 431 firms out of which 124 are optioned and rest are non-optioned. The dependent variable are*EAR*and *EAR_Market*, around the QEA dates for firms in the sample. A dummy variable (*OPT*) on behalf of whether a firm is optioned or not is included. Theanalysisisconducted on firms selected on thefiltering criterion spanning the period from the year 2009 to 2014. For calculating the*EAR*,the daily average abnormal return during the pre-earnings announcement days on day t (where t = "14 to -1) is the difference between that day's return and the expected return between the days between -64 to -15. The daily average abnormal return during the post-earnings announcement days on day t (where t = +1 to +6) is the difference between that day's return and the expected return between the days between +7 to +20. The *EAR* equals the difference between theaverage abnormal returns post-announcement and pre-announcement. For calculating the *EAR_Market*, the daily average abnormal return on the day t (where t = "20 to +20) is the difference between that day's firms' return and the expected return from the market model assumed. The Nifty50 return index, is a proxy for the market index. The*EAR_Market* equals the difference between theaverage abnormal returns post-announcement and pre-announcement. Control variables used in the regression equation are: Abnormal firms' trading volume ratio (*ShrRatio*), market capitalization (*Market Cap*), stock trading volume (*Share Traded*), book to market ratio (*BV/MV*), idiosyncratic volatility (*Volatility*) and firms' beta (*Beta*). Robust standard errors are in parentheses. Durbin-Watson statistic is used as a test to detect autocorrelation. A significant BPG test statistic indicates that heteroscedasticity was present; and that is why I have used white's variance-covariance matrix to obtain heteroscedasticity consistent coefficients as shown above.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

to the non-optioned firms. I usedthe firms listed on CNX500 for the analysis. The result shows that abnormal returns of the optioned firms vary significantly differently compared to the non-optioned firms. It implies that the average abnormal returns for the optioned firms are more before the announcement and take less time to disseminate compared to the non-optioned firms; the investors with (private) information about the QEAs trade in the optioned firms and disseminate the information into the underlying stock prices. The results of this paper confirm that options contribute towards the price discovery and enhance the informational efficiency, as they allow the investors to align their strategies with sign and magnitude with respect to their information in a better manner compared to the stocks. The study also show that the effects of shocks from the news events (like earnings announcements) are felt for a longer duration for the firms that are non-optioned compared to the firms that are optioned. This phenomenon in the literature is termed as 'leverage effect'; and analysis shows that it is observed more in the firms that are non-optioned. Therefore, the firms with options trading have greater information content conveyed into the stock prices just before the QEAs; consequently showing that options trading increases the informational efficiency of the equity market by disseminating the new information more rapidly into the stock prices.

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