Impact of Legal Insider Purchase of Shares on the Stock Price: Empirical Evidence from Dhaka Stock Exchange

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Abstract
This study looks at share price behavior in reaction to corporate announcement of directors' intention to purchase shares from secondary market. Corporate announcement dates have been taken from share purchase notifications given to the Dhaka Stock Exchange (DSE) authority by the companies listed on the DSE from May 1, 2013 to April 30, 2014. Event study methodology has been employed to test abnormal returns on the announcement day and consecutive five days thereafter. The results show that average abnormal returns (AAR) are positive over first two days suggesting share prices increase when directors announce their intention to purchase shares. The t-test employed to examine the significance of cumulative abnormal returns (CAAR) revealed that abnormal returns are significant on first three (two) days at 5% (1%) level confirming the hypothesis that insider purchase announcement affects the DSE market over a short span.
Keywords: Corporate announcement, Dhaka Stock Exchange, Event study, Insider purchase.

1. Introduction
Studies on reaction of emerging markets to insider trading are relatively sparse compared to those related to developed markets. Trading regulations in new emerging markets are often not stringent and it may be possible for insiders to trade based on material non-public information. International Organization of Securities Commissions (2003) reports that insider trading, as defined by Bangladesh Securities and Exchange Commission, refers to buying, selling or otherwise transferring of securities by an insider based on the undisclosed price sensitive information of the issuer company. However, in the absence of any undisclosed price sensitive information insiders can trade on secondary market provided they notify stock exchanges in advance.

The objective of this study is to observe share price reactions over a short span when directors make announcements of their intention to purchase shares from stock market. No inference about market efficiency is being made here and therefore the event window for testing reaction has been kept short on purpose. The Dhaka Stock Exchange (DSE) trading regulations require written notification to be communicated to the DSE authority by every sponsor [sic] of his or her intention to trade shares at least four working days before the sponsor's execution of the trade. According to Chapter XII paragraph 43(7) of *The Listing Regulations of Dhaka Stock Exchange Limited* (1996) the word "sponsor" has been meant to include director, promoter, officer or other insider of listed companies. Unlike in USA where insider trading must be notified *after* the deal within two working days in Form 4 of SEC, the DSE regulations require notification *before* the deal. Thus this study is focused on price reactions on the notification date i.e. event day and the purchase period *subsequent* to the notification date. In particular, this study is to find out abnormal returns and their statistical significance on the corporate announcement of directors' intention to purchase shares and on the consecutive five days thereafter.

Since all notifications given by directors of listed companies are flashed in DSE news clips and websites immediately, any announcement of share purchase intention by a director would provide other investors in the market a potential source of information. In an emerging market like DSE where there is no report so far of any sound evidence of semi-strong form of efficiency, outsiders can only occasionally utilize the news about insiders' share purchase efforts to their benefit. Alternatively, it can also happen that insiders are timing their purchase schedule to their own benefit by utilizing superior prediction ability compared to outsiders.

2. Literature Review
Market reactions to insider trading, both short and long term, have been studied globally and in both developed and emerging markets. While long term studies can also shed light on market efficiency short term studies mostly focus on abnormal price spikes in a short span around the insider trading dates.

Givoly and Palmon (1985) examined insider trading in the companies listed on AMEX from 1973 to 1985 and found that abnormal returns are generated when outside shareholders follow inside shareholders investment behaviour. Similarly Benesh and Pari (1987) also looked at long run trend and concluded that buying and holding securities for a year or longer period based on recent inside share purchase news would provide abnormal returns for outsiders. However, Seyhun (1986) concluded in his study that although insiders can successfully predict stock price and benefit from abnormal returns, outsiders cannot use insider trading information successfully due to market efficiency. Lakonishok and Lee (2001) dealt with data from three

exchanges over 1975 to 1995 but did not find any significant abnormal returns on or around insider trading dates. But they found abnormal returns being earned by insiders over longer horizon. Interestingly, they also found inside purchase to be relatively more informative than inside sales. That inside purchase has more impact on the market than inside sales has also been reported by Jeng, Metrick and Zeckhauser (2003). This has prompted me to focus on the purchase side of insider trading in this research undertaken.

Studies which focus on short term abnormal returns mostly use event study methodology and test of significance. Aktas, de Bodt *et al.* (2007) studied significance of abnormal returns over short term as well as over a longer horizon using data from Euronext Amsterdam exchange. On the short span they looked at cumulative average abnormal return (CAAR) over two, three and five days after and around insider trading. Their findings suggested some significance of CAAR over short span, although they found CAAR over longer horizon more significant using t-tests. This, in contrast to Lakonishok and Lee (2001), shows that there can be statistically significant abnormal returns around trading dates. But they refrain from calling it economically significant. Friederich, Gregory, Matatko and Tonks (2002) looked at abnormal returns twenty days before and after the trading in shares by directors of companies in the U.K. Their study also found positive gross abnormal returns emerging from trades around directors' trade dates.

Since the purpose my paper is to look at possible abnormal returns over a short span on event day and immediately thereafter, it is necessary to address whether the DSE market has some form of efficiency to process publicly available information.

An efficient market is generally considered one where it is not possible to earn abnormal profit based on any publicly available information. If abnormal profits can be reaped for a brief period then the market is considered semi-strongly efficient. If the DSE market is weak then future prices cannot be forecasted in theory although practitioners of technical analysis would rely on financial modelling of all sorts. Nevertheless, in a weakly efficient market occasional abnormal return is very much possible based on publicly available sensitive information, if not based on historical prices alone.

One of the earliest studies on market efficiency of Dhaka Stock Exchange (DSE) was done by Alam (1999) using variance ratio test on monthly returns using 1986-1995 data. The results showed that the DSE follows a random walk suggesting weak form efficiency. Mobarek (2000) used daily price index data of 1988-1997 but found no efficiency using auto-correlation tests and runs.

Maxim, Miti and Arifuzzaman (2013) observed random walk of returns after the 2010 market crash but non-randomness prior to that. This study rejects weak efficiency but suggests lower degree of efficiency due to loose regulatory disclosure requirements, discontinuity and thinness in trading.

Test of CAPM in Dhaka Stock Exchange was done by Ali, Islam and Chowdhury (2010) by investigating relation between risk (beta) and return using classical Fama and Macbeth (1973) approach. Their findings revealed a weak risk return relation and limited practical application of CAPM.

The above studies on EMH suggest that it may be possible to see abnormal price spikes on occasions due to publicly circulating information in an emerging market like the DSE. Although there are quite a few event studies relating to dividends declaration and market reaction, no studies have been found to date relating to directors' share purchase. There is one study on abnormal price spike upon misinformation circulating in the market. Ahsan, Gani & Hasan (2013) studied market reaction to the publicity of fake news relating to banking industry and found volatile spikes in security prices and market index of the DSE. However, this study was limited to descriptive statistics and no test of significance was done.

3. Data and Methodology

The sample event dates have been collected over one year period from May 1, 2013 to April 30, 2014 inclusive. The sample period could not go before May 1, 2013 because the market index used in this study was the DSE broad index (DSEX) which was launched by the DSE starting January 28, 2013. This new index is an improvement over the previous index called the DSE general index (DGEN). The improvement has been made in collaboration with an expert team of the Standard and Poor (S&P). Due to a possible disconnect between DSEX and DGEN the latter was not used in this study. Only the DSEX has been used as a market index. Therefore, in order to give sufficient length of time for the estimation period plus twenty days of interval between the estimation window and the event window, the start of the event window has been decided to be May 1, 2013. All of the listed shares on the DSE have been explored for announcements of desired share purchase by directors.

The final sample size consists of forty-nine companies. If there was a second announcement by a same company care has been taken to ensure that the gap between two announcements is at least twenty-five days in order to consider the second announcement as another observation in the sample. Otherwise only the first announcement date was selected. Announcements for purchase of preferred shares or other special shares not being traded in the secondary market have been excluded from the sample event dates. Purchases of shares due to exercise of options or pursuant to court orders have also been excluded.

The source of sample event dates was DSE news clips picked from the website of Stock Bangladesh Limited. Daily closing prices of firms and daily indexed price of DSE broad index (DSEX) were purchased directly from the DSE library.

3.1 Selection of Event Windows and Estimation Windows

Short but several event windows have been designed for testing the significance of abnormal returns. Since the DSE regulation requires directors and other sponsors to complete their purchase of shares within four days from the announcement dates, six event windows were considered here. This covers the four days stipulated by the DSE plus announcement or event date, and one additional day immediately after the stipulated four days. In other words, six event windows have been considered for each firm in the sample as follows: [0, 0], [0, 1], [0, 2], [0, 3], [0, 4] and [0, 5]. Here 0 refers to the event day i.e. announcement day, the numbers 1 through 4 refer to four days mandated by the DSE to complete the purchase, and 5 is the day immediately after the purchase period. The interval between the event windows and the estimation windows was [-20, -1] for all the sample firms.

The estimation window for calculating parameters of regression was [Jan 28, 2013, -21]. Since the proxy for the market index (DSEX) starts from Jan 28, 2013, the date cannot go before that. The number of days in the estimation window varied from firm to firm. But for no firm in the sample, the number of days was less than forty. Thus the size of the days was sufficiently large for the purpose.

3.2 Description of Model and Procedures

The choice of a model in this study is less of a concern because model selection has less impact on results where event windows are short. Market model has been used here for estimating the parameters and subsequently calculating the abnormal returns. Market model relates the return of a given stock linearly to the return of the overall market portfolio. It is widely used in event studies where abnormal returns accumulated over time are tested for significance.

First, daily returns were calculated from daily closing prices of each of the securities in the sample. For example, the return on day t of security i would be $R_{it} = [P_{it} - P_{it-1}]/P_{it-1}$ where P_{it} = price of security i on day t and P_{it-1} = price of security i on day t-1. Similarly, daily market returns R_{mt} were also calculated from the DSEX index. Then regressions were run over the estimation period for each security i with market returns, R_{mt}, as independent variables and security returns, R_{it}, as dependent variables. This has yielded the parameters α_i and β_i of security i, which are intercept and beta or slope of security i respectively. These two parameters were then used to calculate the abnormal return for each security i on each day over the event period. The calculation was done with the equation $AR_{it} = R_{it} - \alpha_i - \beta_i (R_{mt})$.

Once abnormal returns of all the sample securities have been found, they were averaged over each day in the event period as AAR_t or average abnormal returns on day t. The calculation was a cross-sectional average of all the securities in the sample N for each t as follows:

$$AAR_t = \sum_{i=1}^{N} AR_{it} / N$$

Finally the sum of AAR_t was calculated as $CAAR_t$ or cumulative average abnormal return over the event window. Thus the calculation of $CAAR_t$ was as follows:

$$CAAR_t = \sum_{t=0}^{T} AAR_t$$

Here T refers to the numerical value of last day in the event window. Thus for window [0, 3] the summation of AAR_t is over four days with t=0 and T=3. Since we have stipulated six event windows $CAAR_t$ was calculated for all six windows.

3.3 Hypothesis Testing

Since $CAAR_t$ calculated above represents a reduced single statistic for all abnormal returns in each of the six event windows, the t-test has been employed here to examine whether CAAR is significant or not in corresponding six event windows.

In particular, null and alternative hypotheses have been formulated for the testing purpose. The null hypothesis is that the cumulative average abnormal return (CAAR) is zero or insignificant on the announcement event of share purchase intention by directors, sponsors and other insiders of companies listed on DSE. On the flip side, the alternative hypothesis is that the cumulative average abnormal return (CAAR) differs significantly from zero on the announcement event of share purchase intention by directors, sponsors and other insiders of companies listed on the DSE. The hypotheses can be briefly expressed as:

H_O: CAAR = 0

H_A: CAAR $\neq$ 0

The t-statistic has been computed by dividing the difference between $CAAR_t$ and H_O value by the estimated standard error. This computation can be expressed as follows:

$$t = [CAAR_t - 0] / [\sigma_t / N^{1/2}]$$

The σ_t in the above formula represents the estimated population standard deviation which has been calculated with the following equation:

$$\sigma_t = \left[\left\{ \sum_{i=1}^{N} (CAAR_t - CAR_{it})^2 \right\} / N-1 \right]^{1/2}$$

The CAR_{it} is the sum of AR_{it} for a particular security i in the sample of N over an event period. N-1 refers to degree of freedom. The significance of CAAR has been tested at 5% and 1% levels. Two-tailed tests were used because the alternative hypothesis H_A is not uni-directional.

4. Results and Analysis of Findings

The numerical findings of this research have been provided in table 1 and figure 1 respectively. On the initial formulation of null and alternative hypotheses no prediction of the direction of share price movement was made. In other words reactions could be in either direction. The focus of the study was simply whether the market reacts at the signal of the event or not on the day of the announcement and over short term of four plus one days time limit stipulated by DSE authority. However, AAR values on the event day and the day immediately following the event day were highly positive, suggesting market responded positively to the news. Thereafter AAR values for next three days were negative, but the absolute AAR values on these three days were quite small compared to the first two days. Day six AAR was positive again but absolute value was smaller than the event day and the day thereafter. Nevertheless, a two tailed t-test was done in order to be consistent with the hypotheses.

4.1 Event Day of Share Purchase Announcement [0, 0]

Both AAR and CAAR on the announcement day was 0.011891744 or 1.19% as per table 1. The corresponding t-statistic of CAAR has been found to be 2.989829219. This is significant at both 5% and 1% level of significance. Therefore, the finding here is that the security prices reacted positively on the event date and the null hypothesis has been rejected.

4.2 Stipulated Days for Completing Share Purchase [0, 1], [0, 2], [0, 3], [0, 4]

On the first stipulated day CAAR was 0.018776876 with corresponding t-statistic of 3.418559325. The calculated t-statistic on this day is even higher than the one paralleling the event day. AAR being still positive, we can say that price continued to react positively and significantly on the day after the event day. Here again null hypothesis was rejected at both 5% and 1% significance level.

On the second stipulated day CAAR was 0.018443321 which is slightly lower than the previous day due to negative AAR. However, the average abnormal return on this day, though negative, is immaterial at only 0.0033%. Resultantly, CAAR on the second stipulated day still proved to be significant at 5% level, although insignificant at 1% level. Thus, for event window [0, 2] the null hypothesis has been rejected at 5% significance level but accepted at 1% significance level.

On the remaining two days stipulated by the regulatory rules to complete the purchase of shares CAAR values were not significant at any level. As table 1 shows t-statistics corresponding to CAAR values on the third and the fourth days were insignificant at 5% level of significance, thus also at 1% level. This suggests that market reacts significantly on the first two days of the four days time limit to buy shares. But the reactions on the last two days have no significance.

4.3 Day after Stipulated Period for Completing Share Purchase [0, 5]

Day six has positive AAR. CAAR on this day is 0.020370619 or 2.04%. But this is insignificant if we compare calculated t-values to critical values. Thus it suggests that market has no reaction to the end of the share purchase period stipulated by the regulatory body.

The above analysis suggests that the DSE market reacts positively and significantly upon announcement by directors of their intention to buy shares. But the actual purchase of shares by directors in next four days may not have any significant impact. This finding is based on gradual decrease of significance of CAAR over these four days and also because of the insignificance of CAAR on the day after the stipulated time limit to buy shares. However, the first day out of these four days has shown significant positive average abnormal return. This could be largely because of the repercussion effect of the announcement i.e. event day and not due to actual execution of the purchase of shares by directors. This suggests that the market takes more time to absorb corporate news.

5. Conclusion

The trading regulations of the DSE require all corporate insiders to notify any share purchase by them to the DSE authority beforehand. This notification is announced immediately on the DSE news website which can send signal to outside shareholders. This study has collected the dates of share purchase announcements by insiders from May 1, 2013 to April 30, 2014 and conducted an event study testing market reactions on the announcement date and subsequent five days. The first four of these five days is the time limit to complete the purchase. The results showed significant abnormal returns on the announcement date and subsequent two days. This may indicate outsiders are using signals from insider announcements to beat up price. It may also indicate insiders are targeting abnormal returns by predicting stock prices. But significant abnormal returns did not continue over the entire purchase period. So insiders actually may not be reaping abnormal returns over the actual four day purchase period. I found that only the first day of the purchase period showed significant positive AAR. But this could be due to the repercussion effect of the announcement date. If this is true then the conclusion is that the DSE reacts to directors' announcements, but slowly, and the DSE does not react to actual purchase of shares by insiders. However, Aktas *et al.* (2007) also warned about two other possibilities in a short term study like this. First, there might be some endogenous link between abnormal returns and insider trading when insiders target particular purchase dates expecting abnormal returns. Second, insiders may have timed their announcement dates to hide some ulterior motives behind their purchase efforts because they could be privy to strategic information to their advantage to this end. Further research is needed to delve into the real interplay of these possible factors.

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Table 1: AAR, CAAR and Hypothesis Testing

| Event Window	AAR	CAAR	t - statistic	H_o at 5% significance	H_o at 1% significance
[0, 0]	0.011891744	0.011891744	2.989829219	Reject	Reject
[0, 1]	0.006885132	0.018776876	3.418559325	Reject	Reject
[0, 2]	-0.000333555	0.018443321	2.141797436	Reject	Accept
[0, 3]	-0.002551790	0.015891531	1.689500450	Accept	Accept
[0, 4]	-0.000922149	0.014969382	1.644871902	Accept	Accept
[0, 5]	0.005401237	0.020370619	1.932972186	Accept	Accept
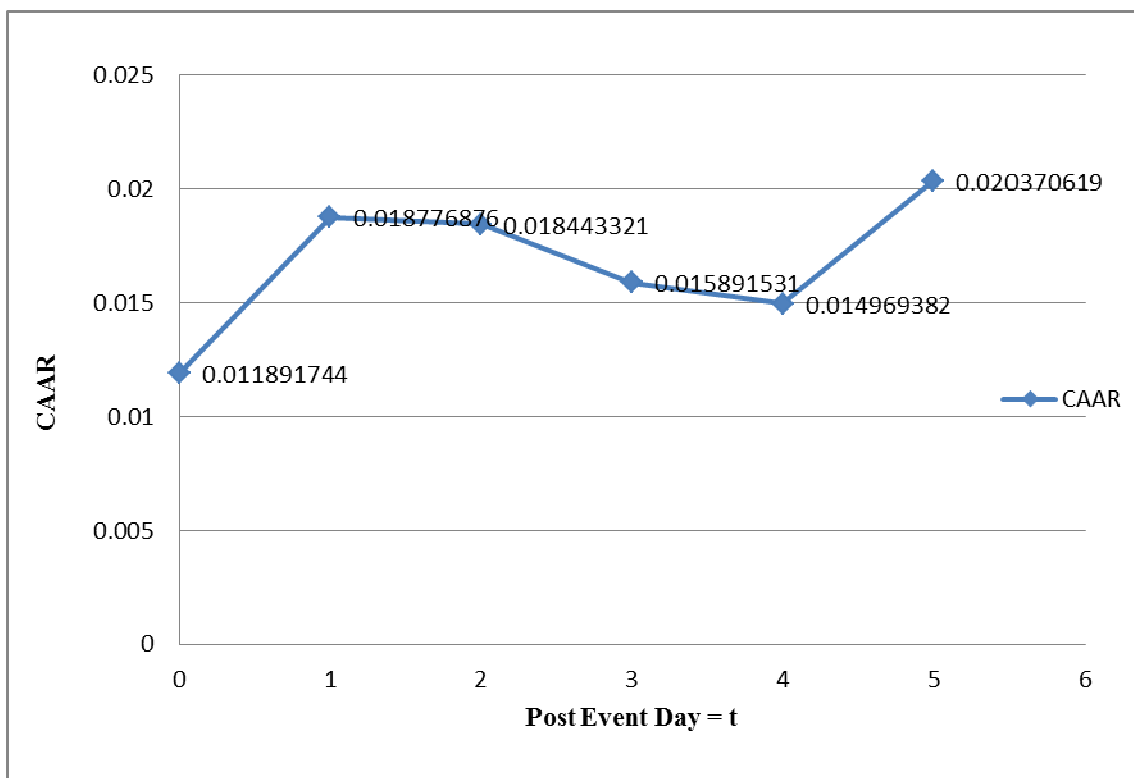
Figure 1: CAAR on Event Day [0, 0] and Post-Event Windows [0, t]