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Directors' stock-purchases on stock performance: Evidence from Colombo Stock Exchange

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Abstract
Purpose: This study examines how directors' stock-purchase transactions would result in stock performance, assessing whether directors' stock-purchase transactions are rapidly reflected in stock prices in Colombo Stock Exchange, Sri Lanka. Moreover, it studies how stock-purchase transactions based on directors' gender, would result in stock performance.
Research Methodology: The analysis covers a period from March 2013 to March 2019, and includes 141 directors' stock purchases. Research issues are investigated using an event-study methodology.
Results: Significant negative abnormal returns follow directors' stock-purchase transactions, which indicates they are not rapidly reflected in stock prices. Gender-wise, male directors' stock-purchase transactions result in significantly negative abnormal returns, whereas for its female counterpart, no significantly abnormal returns are observed. Further, both male and female directors' stock-purchase transactions are not rapidly reflected in stock prices.
Limitation: The study does not consider the number of shares purchased. Certain director stock purchases have to be omitted due to a lack of data.
Contribution: Policy-makers could implement actions to prevent harmful trading activities and to improve the reporting timelines of directors' stock purchases. Consequently, the information asymmetry could be minimized. Hence, investors could engage in stock purchases confidently, which results in mitigating the company's cost of capital.
Keywords: Colombo Stock Exchange, Directors' stocks-purchases, Female directors, Male directors
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1. Introduction

Efficient Market Hypothesis (EMH) implies that markets are rational, and stock prices fully reflect all available information. Investors' prompt behavior makes stock prices rapidly adjust to new information, and reflect all available information. Therefore, no investor will conquer the market with an abnormal return (Latif, Arshad, Fatima & Farooq, 2011)( ). However, EMH has been subject to long and extensive debate in financial stock markets, as stock markets are in contradiction with the underlying assumptions of EMH's (Patil & Rastogi, 2019; Rossi, 2015).

Accordingly, a market participant with private information will benefit as a result of generating abnormal returns, which ensures that information asymmetry has a positive effect on stock returns (Yassin, Ali & Hamdella, 2015). Reflecting the above, numerous empirical studies in the United States

(US), United Kingdom (UK), and other European countries suggest that information asymmetry between directors and outside investors enables directors to outperform other investors when trading in their company stocks (Baty, 2008)( ). Such studies have been widely carried out in both developed and emerging markets, but works on frontier markets, such as Sri Lanka, are limited (Perera & Nimal, 2017)( ). Moreover, the brokerage community reveals a lack of comprehensive studies conducted on directors' stock tradings in Sri Lanka (Shauketaly, 2012). Therefore, this study attempts to fill this gap by examining the impact of directors' stock-purchases on stock performance. Further, it analyzes the speed of adjustment of stock prices for directors' stock-purchases in the Colombo Stock Exchange (CSE).

Directors can be divided as male and female based on gender, in addition to executive and non-executive. Ethnicity, gender, and racial diversity of boards of directors is a crucial issue for directors, shareholders, and members of large corporations (Carter, Simkins & Simpson, 2003). Regardless of a decade of studies, what affect the diversity of boards could have on the market value of the company still remains unclear. Two years after businesses nominated women to board experience, a decrease in market value is observed (Solal & Snellman, 2019). One possible explanation for this surprising finding is the stock market being biased; hesitation to consider women as an experienced component in decision-making. If this is the issue, although the diversity of the board has no impact on operational performance (Musah et al., 2019 & De Cabo et al., 2012, as cited in Musah & Adutwumwaa, 2021), it would still adversely affect market returns (Solal & Snellman, 2019).

Studies on gender roles in corporate boards indicate that women represent 10.3% of the board members in 67 countries (Terjesen, Aguilera & Lorenz, 2014). Similarly, following the International Finance Corporation (2018 and 2019), the average board size of the Sri Lankan listed companies with female directors was significantly lower than those with male directors; most likely because, despite the limited number of women on the board, gender differences and barriers exist at the board-level (Gunawardena, 2017), resulting in women directors being segregated, isolated and discriminated when accessing information (Konrad, Kramer & Erkut, 2008). As a result, the amount or consistency of information they receive on the company may be less compared to male directors (Gregory, Tharyan & Tonks, 2009).

Hence, their stock trading nature becomes an indicator of this in terms of stock performance similar to male directors (Gregory, Jeans, Tharyan & Tonks, 2012), leading to the conclusion that directors' stock tradings are gender-dependent (Bharath, Narayanan & Seyhun, 2009). Therefore, if outside investors are to mimic director stock trades, analyzing directors' stock performance based on gender is crucial as an investment tool.

Directors, as insiders, are experts with broad knowledge and information about the company[(i)], and their trading behavior provides valuable information concerning the company. Accordingly, information signaling theory implies that insiders purchase stocks if they receive positive information about the company (Louis, Sun & White, 2010). However, Dickgießer (2010) states that regardless of intentional-signaling and liquidity requirements, rational investors purchase their company's stock only if they believe it is undervalued. Hence, positive responses in the market can be predicted after directors' stock-purchases transactions.

However, the consequences of such purchases being in par with the predicted outcomes and whether it would reflect stock prices more efficiently are problematic. Contradictory evidence is found on the performance of stock-purchase transactions of directors in many countries (Hossain, Heaney & Yu, 2018; Perera & Nimal, 2014; Perera & Nimal, 2017; Lee & Bishara, 1989; Lakonishok & Lee, 1998; Brown & Foo, 1997, as cited in Hossain et al., 2018; Brown, Foo & Watson, 2003; Antoniadis, Gkasis & Sormaset, 2015; Berkman, Bradrania, Prodromu & Westerholm., 2016) as well as for stock price efficiency (Perera & Nimal, 2014; Perera & Nimal, 2017; Lakonishok & Lee, 2001; Berkman et al., 2016; Bajo & Petracci (2006), as cited in Dardas & Guttler, 2011; Bajo, 2010; Jaffe, 1974; Betzer & Theissen, 2008; Fidrmuc, Goergen & Renneboog, 2006). Hence, this study provides a certain value

addition to the existing literature by bridging this gap. Further, EMH suggests that prices fully reflect all available information, and, if fails, becomes a challenge to EMH (Dickgießer, 2010).
Concerning the directors' gender, two different views can be presented; that the stock market does not regard women as an expert factor when making business decisions (Solal & Snellman, 2019), and, the contrary view, that women exhibit prudent behavior compared to men, in making decisions under risk (Filippin & Crosetto, 2014). Hence, certain conflicting evidence is found on gender-based performance of directors' stock tradings (Odean, 1998; Barber & Odean, 2001; Bharath et al., 2009; Gregory et al., 2012). Consequently, this initiates interest to investigate, how directors' gender would affect stock performance once they trade.

Therefore, considerable solutions to narrow these research gaps are essential. Hence, the main objectives of this study are examining, how directors' stock-purchase transactions affect stock performance and assessing whether directors' stock-purchase transactions are rapidly reflected in stock prices in CSE. Further, based on directors' gender, this study examines (2) how male directors' and (3) how female directors' stock-purchase transactions would result in stock performance as secondary objectives.

The introduction section of this paper illustrates the background of this study. The literature review is presented in the next section. Then, the research methodology to achieve the research objectives is discussed. The next section, i.e. results and discussion section, precede the final conclusions section.

2. Literature review and hypothesis development

In Sri Lanka, legally, "directors of companies listed in the CSE must disclose dealings in stocks of firms on whose boards they sit following Section 7.8 of Listing Rules (Sri Lanka). In accordance with this, Listed Entity shall make an announcement to the Exchange within five (05) market days immediately upon such acquisition or disposal" (Listing Rules, n.d, s.7.8,p.21).
In terms of directors' stock-purchases on stock market efficiency, Jaffe (1974) suggests that the US stock market is efficient under both strong and semi-strong forms of EMH, because, the cost of transactions is higher than the gross profit for insiders and outside investors. Lakonishok and Lee (2001) conclude that it is difficult to introduce trading strategies, indicating the efficiency of the US stock market for directors' trading signals. In the UK, Gregory, Matatko, and Tonks (1997) provide no conclusive evidence on the efficiency of the UK stock market. Conversely, Fidrmuc et al. (2006) provide evidence of the efficiency of the UK stock market. Berkman et al. (2016) suggest that director stock tradings are incorporated into stock prices with a delay in Australia, due to regulatory involvements. In Sri Lanka, Perera and Nimal (2014) reveal that trading volume and trading percentage of director stock-purchase transactions are rapidly reflected in stock prices. Conversely, after three years of their study, no conclusive evidence on stock market efficiency in CSE is observed (Perera & Nimal, 2017).

However, continental Europe and other countries show mixed results. Klings et al. (2005); Stotz (2006); Dymke and Walter (2008); Betzer and Theissen (2009, as cited in Dardas & Guttler, 2011) found significant abnormal returns based on directors' tradings in Germany, leading to the suggestion that it is difficult to deduce clear consequences for the performance of the German stock market. Moreover, Eckbo and Smith (1998) find no effects in Norwegian stock market. Brio et al. (2002) identified that directors can earn abnormal returns in Spain. In the Italian market, Bajo and Petracci (2006, as cited in Dardas & Guttler, 2011) observed, abnormal market performance occurs after a director's tradings, usually between the first and third months after the directors' trades. In contrast, the Italian market instantly reacted to the directors' stock trades (Bajo, 2010).

Considering the transaction type, many researchers found directors' purchases to be more profitable than their sales in the US, the UK, and Sri Lanka (Lee & Bishara, 1989; Lakonishok & Lee, 1998; Perera & Nimal, 2014; Perera & Nimal, 2017), due to numerous factors involved in sale and purchase of stocks. Amongst numerous explanations for why directors sell stocks, only one justification exists as

to why directors buy stocks; to make money. Stock-purchases tend to reflect more information than sales on the company's value or prospects (Lakonishok & Lee, 1998; Jeng, Metrick & Zeckhauser, 2003). Further, as Gregory et al. (2009) and Hossain et al. (2018) disclose, in the UK and the US context, directors exhibit market timing skills where they buy stocks after a run-down in stock price. The market often interprets purchasing signals as a reliable indication of firms' prospects than selling signals. Nonetheless, several studies have established an opposite view. A study by Brown and Foo (1997, as cited in Hossain et al., 2018) reveals that directors' stock-sale transactions provide more information about a company's future performance than stock-purchase transactions, in Australia. Similarly, Brown et al. (2003) reveal that directors make abnormal returns from sales, in Australia. Further, a recent study by Antoniadis et al. (2015) and Berkman et al. (2016) note that directors' purchases are not associated with positive abnormal returns in Greece and Australia respectively.

In terms of gender aspect, one dimension of gender disparities are the perceptions of ethical decision-making, which is particularly relevant in directors' trading. Betz, Michael, O'Connell, and Shepard (1989) state that in the US, men are more than twice as likely as women to engage in actions regarded as unethical. They notice that 50% of men are willing to purchase based on insider information. Moreover, the studies show that men are usually more confident in their abilities and capabilities than women, resulting in men trading more than women, leading to lower returns (Odean, 1998; Barber & Odean, 2001). Bharath et al. (2009) state that male directors obtain higher returns than female directors in the US. Conversely, as identified, the returns to female directors are significantly higher than those for male directors in the UK (Gregory et al., 2012).

Furthermore, evaluating the effect of gender on stock performance, Gregory et al. (2009) contend that in the UK, market response to directors' transactions is not influenced by gender but by category. A study by Gregory et al. (2012) on how the stock market perceives relative capabilities of male and female managers in the UK, reveals that the short-run market responses retain a 'gender bias', reflecting the prevalence of negative stereotypes, where the market reacts to 'beliefs' rather than 'performance'. In the announcement period, market reaction fails to reflect the actual information-gathering capabilities of female directors but reveals only the market's perception of such capabilities, which may have less to do with their actual capabilities and more to do with gender stereotyping.

It is evident that extant literature lacks evidence on directors' stock tradings and stock performance in Sri Lanka. Moreover, a dearth of studies has been conducted to identify the performance of directors' stock tradings based on gender. Hence, this study is intended to mitigate these gaps.

3. Research methodology

In order to achieve the main objective of this study, it is hypothesized that there is a significant impact of directors' stock-purchase transactions on stock performance (Hypothesis 01). To achieve the first sub-objective, it is hypothesized that there is a significant impact of male directors' stock-purchase transactions on stock performance (Hypothesis 02). Hypothesis 03 deals with the second sub-objective; it is hypothesized that there is a significant impact of female directors' stock-purchase transactions on stock performance.

The purposive sampling technique was employed to select the sample, that falls between March 2013 and March 2019, inclusive of both years. After screening the events for selection criteria, the final sample was filtered to 141 directors' stock-purchases: 104 for male directors' stock-purchases and the remainder from female directors (Table 1).

Table 1. Summary statistics of the dataset

Director category	Number of directors' stock-purchases
Male directors	104
Female directors	37
Total	141

In addition to directors' stock-purchases, daily market returns and stock returns were used as data for the analysis.

Source: Author-compiled

The event-study methodology was employed to examine how directors' stock-purchases would result in stock performance. In an efficient capital market, the market should respond to a large number of directors' trades on the day of the transaction. Lakonishok and Lee (2001) concluded that a "larger abnormal return is reported around the trading period of insider trades than in the reporting period" (as cited in Perera & Nimal, 2014). Based on the literature discussed above, this study also considers directors' stock trading date (purchase date) as the event day (t = 0).

Further, the study adopted an event estimation period of 50 days before the pre-event window, to estimate the alpha and beta of stocks to measure the expected return of each stock for each event. As the underlying assumption of insider trades would be reflected in stock prices within a shorter time horizon (Perera & Nimal, 2017) this study used an event window of -21 to +21 days to examine how directors' stock-purchases would result in stock performance in CSE. Further, to analyze potential impacts on stock performance, on and after the announcement date of the directors' stock tradings, different shorter event windows were considered [Window 1(W1), Window 2 (W2), and Window 3 (W3)], which was documented at end of the results and discussion section.

The estimation window and the event window of the current study are illustrated below.

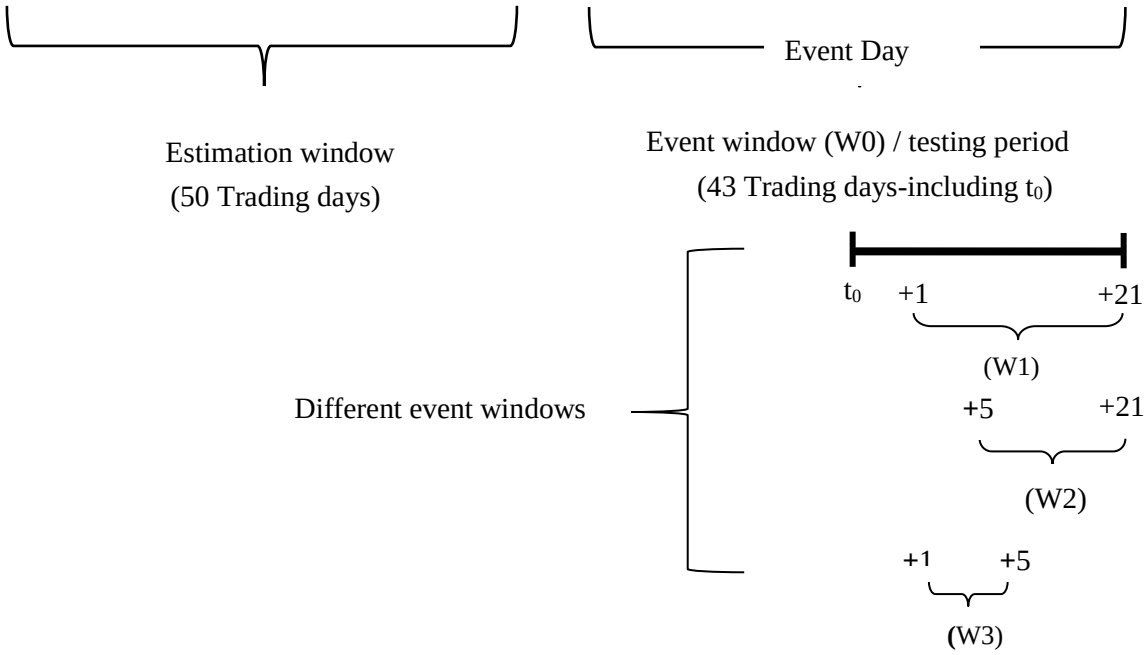

Figure 1. Event-study
Source: Author-compiled
Note: Both event date/transaction date/trading date/purchase date and the announcement date/published date are in the event window of -21 to +21.

Since the degree of information-asymmetry between insiders and outsiders cannot be measured directly, following Seyhun (1986) and Rozeff and Zaman (1988), the performance of directors' trades was used as the proxy (as cited in Perera & Nimal, 2017, p.7) to measure stock performance, in terms of Average Abnormal Returns (AARs) and Cumulative Average Abnormal Returns (CAARs). Statistical

significance of stock performance is evaluated using parametrical statistical tests for AARs and CAARs (Dissabandara, 2000; Dissabandara & Samarakoon, 2002; Perera & Nimal, 2014; Antoniadis et al., 2015).

After calculating the daily stock returns and market returns, the market model was selected and used to determine the expected returns, and thereby the abnormal returns. The market model is estimated through Ordinary Least Square (OLS) regression. Regression analysis produced the estimation of regression intercept (α) and regression slope (β) which will be used in computing the expected returns in the testing period.

Consequently, Market Model was specified (Dissabandara, 2000) as follows:

$$R_{it} = \alpha_i + \beta_i (R_{mt}) + \varepsilon_{it}$$

Where R_{it} is the return of stock i on day t, R_{mt} is the return of the market, α_i is the intercept term, β_i is the systematic risk of stock i, and ε_{it} is the error term

Daily expected returns are estimated using the market model for each event (Dissabandara, 2000; Dissabandara & Samarakoon, 2002; Antoniadis et al., 2015) as follows:

$$E(R)_{it} = \widehat{\alpha_i} + \widehat{\beta_i}\ R_{mt}$$

Where E (R_{it}) is the expected return of the stock i in the event window, R_{mt} is the return of the market, $\widehat{\alpha_i}$ is the estimated intercept term of stock i and $\widehat{\beta_i}$ is the estimated systematic risk of stock i

Consistent with Anuradha and Nimal (2017), Dissabandara (2000), Dissabandara and Samarakoon (2002), and Antoniadis et al. (2015) the abnormal returns were calculated as follows.

$$AR_{it} = R_{it} - E(R_{it})$$

$$AR_{it} = R_{it} - (\widehat{\alpha_i} + \widehat{\beta_i}\ R_{mt})$$

Where AR_{it} is the abnormal returns of the stock i on day t in the event window.

To examine the stock performance, AARs and CAARs were computed before and after the trading date. Thereafter test statistics were calculated to measure the statistical significance of ARRs as well as CAARs.

The test statistic (parametric test) for AAR for any day t, was calculated assuming that AR_{it} is normally distributed with zero mean and constant variance (σ^2_i). The standard deviation (σ) of AAR_t can be expressed as:

$$\sigma^2\, AR_t = \frac{1}{N-1}\sum_{i=1}^{N}(AR_{it} - AAR_t)^2$$

$$\sigma^2\, AAR_t = \left[\frac{1}{N}\right]\sigma^2(AR_t)^2$$

$$\sigma\,(AAR_t) = \sqrt{\left[\frac{1}{N}\right]\sigma^2\, AR_t}$$

Where N is the number of events in the sample

$$t(AAR) = \frac{AAR_t}{\sigma(AAR_t)}$$

The test statistic (parametric test) for CAAR for any day t is calculated as follows:

Assume $CAAR_t \sim (0, \sigma^2_T)$

$$\sigma(CAAR_t) = \sqrt{T\sigma^2\ (AAR_t)}$$

$$t(CAAR) = \frac{CAAR_t}{\sigma(CAAR_t)}$$

Where T is time: number of days over which ARRs are cumulated

4. Data analysis and interpretation

The results indicated that directors' stock-purchase transactions were associated with negative CAARs, three days after the transaction date (Table 2), leading to the conclusion that directors' stock-purchase transactions have a negative impact on stock performance, which is on par with hypothesis 01. Concerning market efficiency, evidence suggests that the directors' stock-purchase transactions were not rapidly reflected in stock prices in CSE.

The market reacted to this information with a delay, resulting in significant abnormalities after three days of the transactions (except day 7, day 18, and day 19), which may be after the official announcement of directors' stock-purchase transactions. Market may consider this as bad news, resulting in negative CAARs. On the event day, no significant positive or negative AAR, and CAAR were found, except for insignificant negative CAARs; an indication of the timing of the directors' stock-purchases. The behavior of AARs and the CAARs during the event window are shown in Figure 2.

Table 2. AARs and CAARs of 141 directors' stock-purchase transactions

Days	AARs	T statistics	CAARs	T statistics
-21	0.11%	0.80	0.11%	0.80
-20	-0.13%	-1.03	-0.03%	-0.15
-19	0.15%	1.03	0.12%	0.49
-18	0.13%	0.86	0.26%	0.82
-17	0.11%	0.64	0.37%	0.95
-16	-0.21%	-1.21	0.16%	0.38
-15	0.10%	0.61	0.26%	0.61
-14	-0.20%	-1.11	0.06%	0.11
-13	-0.11%	-0.93	-0.05%	-0.15
-12	-0.30%	-2.35*	-0.36%	-0.88
-11	-0.25%	-2.06*	-0.61%	-1.50
-10	-0.20%	-1.46	-0.81%	-1.68
-9	0.07%	0.41	-0.74%	-1.21
-8	-0.24%	-1.23	-0.98%	-1.35
-7	-0.10%	-0.73	-1.08%	-2.02*
-6	0.33%	1.44	-0.75%	-0.82
-5	-0.01%	-0.10	-0.76%	-1.33
-4	-0.19%	-1.49	-0.96%	-1.73
-3	-0.17%	-1.29	-1.13%	-1.97*
-2	-0.09%	-0.61	-1.22%	-1.77
-1	0.00%	0.03	-1.22%	-2.20*
0	0.15%	1.15	-1.07%	-1.74
1	-0.19%	-0.95	-1.26%	-1.30
2	0.01%	0.07	-1.25%	-1.46

3	0.03%	0.21	-1.22%	-1.71
4	-0.07%	-0.62	-1.28%	-2.38*
5	-0.02%	-0.17	-1.30%	-2.06*
6	-0.14%	-1.17	-1.44%	-2.28*
7	0.18%	1.49	-1.27%	-1.99
8	-0.22%	-1.76	-1.48%	-2.19*
9	-0.18%	-1.22	-1.66%	-2.04*
10	-0.25%	-1.71	-1.92%	-2.29*
11	-0.09%	-0.62	-2.01%	-2.45*
12	-0.05%	-0.32	-2.05%	-2.48*
13	-0.15%	-1.28	-2.20%	-3.18*
14	0.08%	0.54	-2.12%	-2.26*
15	0.01%	0.04	-2.11%	-2.26*
16	-0.13%	-1.04	-2.24%	-2.90*
17	-0.20%	-1.41	-2.44%	-2.74*
18	-0.26%	-1.09	-2.70%	-1.78
19	0.11%	0.44	-2.60%	-1.62
20	-0.20%	-1.37	-2.80%	-2.93*
21	-0.18%	-1.51	-2.98%	-3.79*

* Statistical significance of test statistics at 0.05 level.
Source: Author-compiled

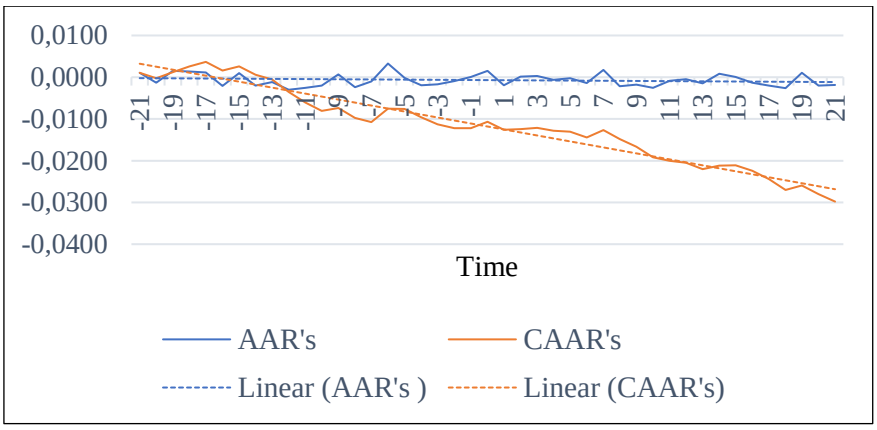

Figure 2. AARs and CAARs during the event window
Source: Author-compiled

Considering the Sri Lankan context, Perera and Nimal (2017) disclosed that high rupee-volume directors' purchases are linked with positive abnormal returns, a view contrary to the outcome of the current study. However, their studies further indicate that the trading percentage of directors' stock-purchase transactions is not associated with significantly positive or/ and negative abnormal returns.

The following research findings also confirm the results of the current study. A study by Antoniadis et al. (2015) in Greece, established that announcements relating to stock-purchases by directors reacted negatively, by having a significant negative return of -2.6040% for the event window.

Further, several authors reveal that stock-purchase transactions of directors fail to capture any future price increases in the Australian stock market (Brown et al., 2003; Brown & Foo, 1997, as cited in Hossain et al., 2018). Moreover, in Hong Kong, no substantial evidence suggests that directors outperform the market shortly after or before announcements (Shauketaly, 2012).

The results of some recent studies, such as of Berkman et al. (2016) in the Australian setting, state that directors' stock-purchase transactions are not associated with positive abnormal returns. More importantly, Chronopoulos, Mcmillan, Papadimitriou, and Tavakoli (2018) indicate that directors' stock-purchases are associated with negative returns in China, Hong Kong, India, Singapore, and Taiwan. According to them, this is an interesting observation as well as a new finding in the context of East-Asian markets, which is a sharp contrast to study results on the US and European markets. They point out that directors purchasing stocks may not always be driven by profit motives; it can be facilitating the stock price of their company or making a market for their company's stocks.

Several authors (Carrell, 2018; Kumar, 2019; Whispernumber, n.d.) conclude that one reason for this negative stock price performance after directors' stock-purchases is insiders sometimes misreading the prospects of the company. Many insiders may purchase even though stock prices plunge. Secondly, insiders cannot be effective judges of the prospects of the company's future; if investors pursue insider transactions they will lose. Another reason is whether investors know when insider buying is good and when it is just signaling. Third-party criticism on stock not being transparent/disclosed or related party transactions or company not performing well, generally director make minor inside-purchases as "proof" for unjustified criticism. Shareholders not being rational to identify this behavior will cost them in the end. Conversely, if investors are aware of the actual projections of the company and these signaling mechanisms, investors sell their stocks, resulting in lower stock prices.

Considering the reflection of the information into stock prices of this study, it was observed that directors' stock-purchase transactions have not been rapidly reflected in stock prices. These results are on par with the results of Perera and Nimal (2017) which state that there is no conclusive evidence to support that the CSE is efficient. The authors argue that in CSE, there is a delayed reaction to the information content of stock trading volumes of directors. Conversely, the findings of Perera and Nimal (2014) indicate that market has reflected the trading volumes of directors' stock-purchase transactions in stock prices immediately around the event day.

Internationally, findings consistent with those of this study on reflection of directors' stock tradings in stock prices are identified. Dickgießer (2010) states that price efficiency is hampered by the risk of arbitration in the German market, concluding that the market is underreacting to directors' stock tradings, which can be explained primarily by risky arbitration costs. Furthermore, reveals that outside investors cannot obtain abnormal returns easily by imitating directors' stock tradings. Betzer and Theissen (2009, as cited in Dardas & Guttler, 2011) and Stotz (2006) also provide the opposite of the stock market efficiency in Germany. Moreover, Telebroke and Wollin (2005) and Rau (2004) highlight the inefficiency of the German stock market as the abnormal returns made by the directors were increasing strongly, which the stock prices reflect this information relatively slowly (as cited in Dickgießer, 2010).

Similarly, in Italy, Bajo and Petracci (2006, as cited in Dardas & Guttler, 2011) observed that the market reacts to director stock tradings with a delay. In Australia, Berkman et al. (2016) suggest that director stock trading information reflects in stock prices with a delay. The study reveals that regulatory authorities in Australia can, access the necessary information, and prevent any identified illegal or suspicious activity, suggesting that, as long as information on directors' stock trading is difficult to track, it will be integrated very slowly into stock prices.

Table 3. AARs and CAARs of 104 male directors' stock-purchase transactions

Days	AARs	T statistics	CAARs	T statistics
-21	0.06%	0.50	0.06%	0.50
-20	-0.15%	-1.08	-0.09%	-0.46
-19	0.08%	0.54	-0.01%	-0.05

-18	0.24%	1.38	0.23%	0.65
-17	0.08%	0.40	0.31%	0.67
-16	-0.15%	-1.24	0.16%	0.54
-15	0.07%	0.39	0.23%	0.49
-14	-0.10%	-0.55	0.13%	0.27
-13	-0.06%	-0.45	0.07%	0.18
-12	-0.18%	-1.30	-0.10%	-0.24
-11	-0.14%	-1.10	-0.25%	-0.58
-10	-0.15%	-1.02	-0.40%	-0.76
-9	0.20%	1.15	-0.20%	-0.31
-8	-0.06%	-0.56	-0.26%	-0.64
-7	-0.11%	-0.66	-0.37%	-0.56
-6	0.14%	0.90	-0.23%	-0.38
-5	-0.11%	-0.84	-0.35%	-0.62
-4	-0.07%	-0.64	-0.41%	-0.94
-3	-0.16%	-1.67	-0.57%	-1.38
-2	-0.06%	-0.39	-0.63%	-0.91
-1	0.09%	0.83	-0.54%	-1.05
0	0.02%	0.16	-0.52%	-1.02
1	-0.01%	-0.08	-0.53%	-1.14
2	-0.02%	-0.28	-0.55%	-1.42
3	-0.02%	-0.12	-0.57%	-0.75
4	0.02%	0.17	-0.55%	-1.09
5	-0.01%	-0.06	-0.56%	-1.03
6	-0.18%	-1.82	-0.74%	-1.43
7	0.02%	0.18	-0.72%	-1.50
8	-0.10%	-1.06	-0.82%	-1.65
9	-0.19%	-1.90	-1.01%	-1.82
10	-0.16%	-1.35	-1.16%	-1.76
11	-0.19%	-1.64	-1.36%	-2.00*
12	-0.13%	-1.26	-1.49%	-2.46*
13	-0.16%	-1.73	-1.65%	-3.03*
14	-0.08%	-0.78	-1.73%	-2.81*
15	-0.15%	-1.38	-1.87%	-2.92*
16	-0.15%	-1.27	-2.02%	-2.73*
17	-0.18%	-1.63	-2.20%	-3.22*
18	-0.06%	-0.62	-2.26%	-3.80*
19	-0.11%	-1.07	-2.37%	-3.68*
20	-0.26%	-1.68	-2.63%	-2.59*
21	-0.13%	-1.03	-2.76%	-3.34*

* Statistical significance of test statistics at 0.05 level.
Source: Author-compiled

A considerable difference between the stock performances of both genders for stock-purchases was observed. Male directors' stock-purchase transactions illustrated significantly negative abnormal results on day 11 and beyond in the post-event window (Table 3). Though the results were negative it was very informative after day 11, supporting the conclusion that male directors' stock-purchase

transactions have an impact on stock performance, which is in line with hypothesis 02. However, except for a significantly negative CAAR for female directors' stock-purchases was observed on day 4 after the transaction day, no significant positive or negative CAARs were observed after the event day (Table 4). Hence, the impact of female directors' stock-purchase transactions on stock performance is negligible (with one significant negative CAAR on day 4); not in line with Hypothesis 03.

Concerning market efficiency, both male and female directors' stock-purchase transactions were not rapidly reflected in stock prices in CSE. Moreover, it took almost 11 days after the event date, for the market to react to male directors' stock-purchase transactions, reaction to which was delayed yet spread rapidly among market participants (by examining the pattern of CAARs); which the female directors' stock-purchase transactions, did not experience throughout the post-event window.

Table 4. AARs and CAARs of 37 female directors' stock-purchase transactions

Days	AARs	T statistics	CAARs	T statistics
-21	0.25%	0.62	0.25%	0.62
-20	-0.10%	-0.31	0.15%	0.34
-19	0.35%	0.92	0.50%	0.76
-18	-0.17%	-0.55	0.33%	0.51
-17	0.19%	0.62	0.52%	0.75
-16	-0.37%	-0.65	0.15%	0.11
-15	0.17%	0.50	0.32%	0.35
-14	-0.48%	-1.03	-0.16%	-0.12
-13	-0.26%	-0.97	-0.41%	-0.52
-12	-0.64%	-2.21*	-1.06%	-1.15
-11	-0.56%	-1.93	-1.62%	-1.68
-10	-0.34%	-1.06	-1.96%	-1.78
-9	-0.31%	-0.74	-2.27%	-1.53
-8	-0.73%	-1.09	-3.00%	-1.19
-7	-0.06%	-0.30	-3.07%	-3.65*
-6	0.87%	1.15	-2.20%	-0.73
-5	0.27%	0.72	-1.94%	-1.27
-4	-0.55%	-1.38	-2.49%	-1.47
-3	-0.20%	-0.47	-2.68%	-1.45
-2	-0.19%	-0.48	-2.87%	-1.63
-1	-0.25%	-0.74	-3.12%	-2.03*
0	0.52%	1.34	-2.60%	-1.42
1	-0.71%	-0.98	-3.31%	-0.96
2	0.11%	0.17	-3.20%	-1.03
3	0.17%	0.50	-3.03%	-1.81
4	-0.30%	-1.03	-3.33%	-2.25*
5	-0.06%	-0.17	-3.39%	-1.80
6	-0.03%	-0.09	-3.43%	-1.77
7	0.62%	1.70	-2.80%	-1.41
8	-0.56%	-1.42	-3.36%	-1.55
9	-0.15%	-0.31	-3.51%	-1.29
10	-0.52%	-1.14	-4.04%	-1.55
11	0.21%	0.48	-3.83%	-1.55

12	0.19%	0.42	-3.64%	-1.36
13	-0.12%	-0.34	-3.76%	-1.73
14	0.54%	1.05	-3.21%	-1.03
15	0.43%	0.86	-2.78%	-0.91
16	-0.07%	-0.20	-2.85%	-1.36
17	-0.27%	-0.59	-3.12%	-1.10
18	-0.83%	-0.95	-3.95%	-0.71
19	0.72%	0.79	-3.23%	-0.55
20	-0.03%	-0.09	-3.26%	-1.43
21	-0.33%	-1.12	-3.59%	-1.89

* Statistical significance of test statistics at 0.05 level.
Source: Author-compiled

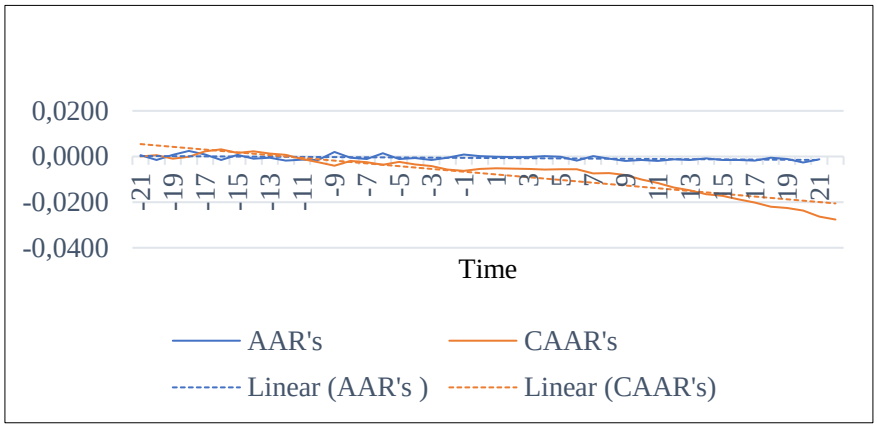

Figure 3. AARs and CAARs during the male directors' event window
Source: Author-compiled

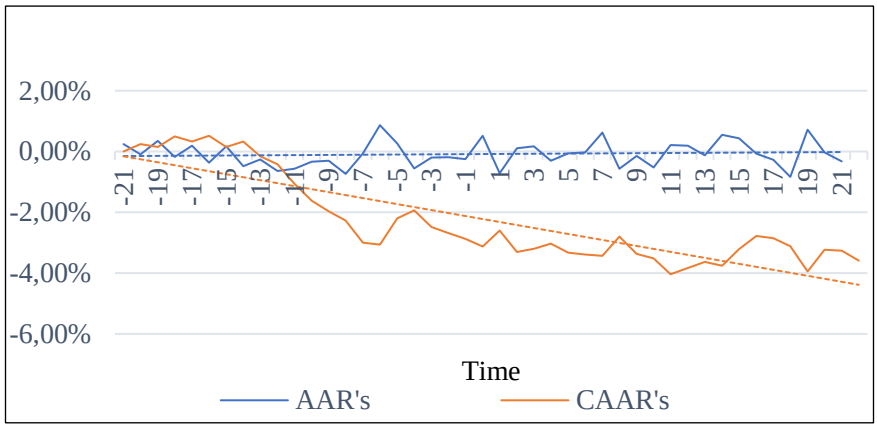

Figure 4. AARs and CAARs during the female directors' event window
Source: Author-compiled

Comparing the results of the impact of male directors' stock-purchase transactions, Gregory et al. (2009) state that markets respond rapidly to the signals of male directors' stock-purchases. Male investors who are deemed more competent and confident than women in their business and abilities are expected to take a greater risk (Mittal, He & Inman, 2019). Hence, the researchers concluded that investment decisions made by men should be at greater risk as their concerns grew, for men who focus on optimizing their benefits increase their risk-seeking expectations, as a result of an increased perception of their self-capacity.

According to Barber and Odean (2001) in the US, men transact more aggressively than women, demolishing their returns as a result of overconfidence. Moreover, US studies (Odean, 1998; Barber & Odean, 2001) illustrate the existence of the disposition effect and excessive trading of individual investors. Moreover, Chen, Kim, Nofsinger, and Rui. (2004) found that sophisticated investors are likely to make trading mistakes and face discomfort in representativeness. The authors conclude that investors' sophisticated behavior does not reduce behavioral biases, nor does it improve trading performance in China.

Gregory et al. (2012), commenting on female directors' stock-purchases state that, if the market perceives female directors to be less skilled and knowledgeable about the firms' affairs, the market hesitates to consider female directors' trades as information-revealing events, irrespective of their actual capability, muting stock price reaction. Moreover, the woman becomes an unknown quantity under certain conditions and is often viewed as a riskier investment than a male Chief Executive Officer (CEO). Nevertheless, occupations dominated by men are marginally but significantly more favorably measured than those by women. A woman CEO may be associated with a greater degree of uncertainty than a new male CEO (as cited in Lee & James, 2003). Further, Dobbin, Jung and Kalev (2011) proposed that gender-diversity changes in director boards are followed by marginally significant stock value decreases. It also showed that women on boards affect investor behavior, contributing to decreases in stock value (Financial Times, n.d.).

Results of different event windows

A dearth of studies in the literature was observed that analyze the impact on stock performance for director stock-purchases, considering both event date and announcement dates together. To bridge this gap in literature different shorter event windows were considered to analyze any impact on stock performance, on and after the announcement date of stock-purchase transactions. The underlined law is that the relevant authorities in the listed company shall make an announcement to CSE within five (05) market days immediately upon such acquisition or disposal. Further, these five (05) market days shall be calculated excluding the relevant date the event occurred (Listing Rules, n.d, s.7.8). Therefore, within these five days (including the fifth day) CSE is in a position to publish this announcement to the market. Therefore, it is assumed that CSE officially publishes this information on the fifth (05) day after the event took place, to avoid the complexity.

The results establish that the increase of the negative CAARs was accelerated on and after the announcement of the directors' stock-purchase transactions (W2) and it was significant compared to the negative CAARs (W3) in between the very first day after the event date, and the announcement date, inclusive of both days. On and after the announcement, the CAARs were -1.70% (Table V). Supported by the negative CAARs in W2, the total significant negative CAARs increased up to 1.91% for the entire post-event window (W1), out of which 1.70% of negative CAARs (W1) were provided on and after the announcement date (W2). On the event date, an insignificant negative CAAR of -1.07%, was observed, whereas a significant negative CAAR of -1.30% was obtained on the announcement date (Table 2).

Table 5. CAARs of 141 directors' stock-purchase transactions: for different event windows

Event window	Results	
	CAARs	T statistics
W1 = (+1, +21)	-1.91%	-3.48*
W2 = (+5, +21)	-1.70%	-3.44*
W3 = (+1, +5)	-0.24%	-0.87

* Statistical significance of test statistics at 0.05 level.
Source: Author-compiled

Considering the gender-wise impact on stock performance under different event windows (Table 6), an acceleration of negative CAARs (W2) on and after the announcement date of the male directors' stock-purchase transactions is observed, and it was significant compared to the CAARs (W3) in between the very first day after the event date, and the announcement date, inclusive of both days. Altogether, the significant negative CAARs (-2.24%) increased for the entire post-event window (W1), and a significant influence on this increase was the significantly negative CAARs (-2.21%) that occurred (W2) on and after the announcement date. More importantly, it was observed that insignificant negative CAARs of -0.52% and -0.56% were obtained on the event and the announcement days, respectively (Table 3).

Female directors' stock-purchase transactions show negative CAARs with insignificant results (Table VI). Even though these CAARs were not significant the trend leaned towards negative aspects.

Table 6. CAARs of CAARs of male (104) and female (37) directors' stock-purchase transactions: for different event windows

Gender wise	Male directors' stock-purchase transactions: Results		Female directors' stock-purchase transactions: Results	
Event window	CAARs	T statistics	CAARs	T statistics
W1 = (+1,+21)	-2.24%	-3.88*	-0.99%	-0.75
W2 = (+5,+21)	-2.21%	-4.25*	-0.26%	-0.22
W3 = (+1,+5)	-0.04%	-0.16	-0.79%	-0.98

* Statistical significance of test statistics at 0.05 level.
Source: Author-compiled

As illustrated, when the announcement was made public, more negative CAARs were obtained, establishing the fact that the market reacts negatively to directors' stock-purchase transactions (Table V), which is massively affected by the male directors' stock-purchase transactions (Table VI). These overall results were obtained without considering the gender impact and once analyzed considering the gender effect, the market responded adversely to male directors' stock-purchase transactions. Information about the directors' stock-purchase transactions was gradually disseminated among market participants who reacted accordingly, resulting in the negative CAARs increasing gradually. Interestingly, female directors' stock-purchase transactions received no market responses.

5. Conclusion

The main objective of this study was to examine, how directors' stock-purchase transactions affect stock performance and assess whether directors' stock-purchase transactions are rapidly reflected in stock prices in CSE. As sub-objectives, the study examined how male and female directors' stock-purchase transactions would result in stock performance. Conclusively, there is a significant impact of directors' stock-purchase transactions on stock performance concerning the first two objectives of the study. However, an absence of impact was found for female directors.

More specifically, the results indicated that the directors' stock-purchase transactions have a negative impact on stock performance. One reason is, directors want to exhibit to the market their confidence in companies by purchasing stocks, when the company is not performing well, to tempt outside investors to purchase company stocks. Further directors' stock-purchase transactions were not rapidly reflected in stock prices after the event date, i.e. initially the market ignored the directors' stock-purchase transactions but reacted with a delay, resulting in inefficiency in the CSE.

In terms of gender, male directors' stock-purchase transactions have a negative impact on stock performance, due to, the market's belief that male directors carry an element of risk, and they reflect unethical behavior. Therefore, investors who do not react to the directors' stock-purchases of females, react to those of males. Moreover, the absence of significant returns for female directors' stock-purchase transactions was obtained through the analysis. Although the exact reason for this market

belief is not clear, investors do not react to such trades. Moreover, the market has not rapidly reflected stock-purchase of both genders in stock prices.

Based on the results, theoretically; it provides significant implications for gender stereotypes based on the market responses for director stock-purchases. Moreover, the EMH theory could be further challenged compared to behavioral finance theory, due to reported market inefficiencies for director stock-purchases. As practical implications, the gender impact can be used as an additional decision-making criterion when mimicking director stock-purchases. Besides, policy-makers could execute required measures to minimize the information asymmetry in the market by considering market movements around the event and the announcement date of directors' stock-purchases. This results in minimizing the company's cost of capital.

Limitation and study forward

This study examined only the general impact of directors' stock-purchase transactions on stock performance, without using control variables. However, the events were controlled by considering only the events free from any announcements during the event window, to capture the exact impact. Similarly, examining the impact did not consider the number of shares purchased by the directors. Certain directors' stock-purchase have been eliminated due to a lack of data. Additionally, individual portfolios were not constructed for stock-purchases to identify the impact.

Constructing individual portfolios is recommended for directors' stock-purchase transactions for different holdings periods by extending the sample size and analyzing the performance of each portfolio against a benchmark, parallel to a gender-effect analysis. Further, verifying and determining the reasons for directors' stock-purchases as well as the number of stocks that they trade when examining the impact of such trades on stock performance is recommended. Events control mechanisms have to be further considered.

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[i] Insider/s are known as 'director/s' hereafter, unless it is specifically mentioned for a special purpose.