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Assessing the Impact of S&P SL20 Index Construction on Listed Companies in Colombo Stock Exchange (CSE)

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Abstract

A stock market index is designed to measure the performance of value of a set of stocks. The set of stock can be entire market of a particular country or a sector. Indices can be used not only to see how the stock market, for instance, has changed over time, but it allows easy comparison between stocks that represent different sectors or even different stocks. An index construction or rebalancing of existing index is a major market event that investor might know before the event take place. The index inclusion reflects a positive situation about the quality, risks and possible future return of the stock. This study examine whether any price and trading volume effects arise from S&P SL 20 index construction. S&P SL 20 index was launched in 26, June 2012, based on 20 blue chip companies in Sri Lanka. The current study employs the standard event study methodology to identify the abnormal returns associated with the launching of the S&P SL 20 index. Three normal return benchmarks, namely the market-adjusted model, mean-adjusted model and the market model have been used for the purpose of finding abnormal returns. Price series and volumes of stocks in S&P SL 20 list (after and before) were considered and those are retrieved from Colombo stock exchange.

The study finds that the abnormal returns following the launch of the S&P SL 20 index is statistically insignificant.

Keywords: event studies, stock market index, hypothesis testing, financial markets, macroeconomy

1. Introduction

1.1 Introduce the Problem

A stock index is a collection of financial instruments which are used to represent either sector of a stock exchange or the whole market. Each of these indices has a different mechanism of calculation. Among the different types of market related and non-market related events, this study focuses the impact of stock index construction. In particularly, we study the impact of launching of S&P SL 20 index on the listed companies performance.

The S&P SL20 Index was initiated on 18 June 2012 and was launched in Colombo on 26 June 2012. The S&P Sri Lanka 20 seeks to be comprised of liquid and tradable stocks for easy and cost effective replication as trading instruments, with possible application as index funds and Exchange-Traded Funds (ETFs). Index constituents are the 20 largest blue chip companies (see Table 1) chosen from the universe of all stocks listed on Colombo Stock Exchange. The indices are calculated using a capped market capitalization-weighting scheme (capped at 15%). The S&P Sri Lanka 20 is calculated in Sri Lankan Rupee. The base period of the S&P Sri Lanka 20 is December 17, 2004. The base value is 1000.

This study explores the effect of the construction of S&P SL 20 index in 26th June 2012 on the companies included in it. We consider 16 companies out of 20 which are listed since the beginning of the index and compare their daily stock performance three years before and after the event took place. In this paper we take a different study to examine the effect of introduction of a new Index on the performance of the listed companies. For this we take a pre- and post- event windows of size three years, as the impact should be long term. We will

study the price effects of the stocks after the introduction of the new Index.

This study intends to answer the following research questions:

RQ1: Is there a change of the price efficiency when the stock is included to the index?

RQ2: Does a significant correlation exist between the returns of stocks that are added to the index?

RQ3: Does a significant correlation exist between the stocks that are added to the index in the same market segment?

RQ4: Is there a correlation between the returns of stocks added to the index and not added stocks in the same market segment?

RQ5: To what extent the index construction announcement affect the added stock of the index and also to the other stocks in the market? What causal relationship does there exist between the stocks? What are the specific reasons?

1.2 Significance of the Study

A stock index or stock market index is a measurement of the value of a section of the stock market. It is computed from the prices of selected stocks (typically a weighted average). It is a tool used by investors and financial managers to describe the market, and to compare the return on specific investments.

Therefore, the S&P SL 20 can be considered as a performance measure of Colombo stock exchange. As far as author concerns, the impact of launching of S&P SL 20 index have not investigated. The findings of the research will be important to all market participants such as investors, managers of the companies and stock exchange regulatory agencies in their decision-making in Sri Lanka and Asian region.

Event study methodology has been extensively used in finding impact of index reconstitution. But as far as literature concerns, the research done in finding out impact of the launching of a new index are limited. So this study address this gap in the literature and establishes that effect of launching of an index can be studied using event study framework.

1.3 Literature Review

Using financial market data, an event study measures the impact of a specific event on the value of a firm (Mackinlay, 1997). Event study framework, which was first introduced by Dolley (1933) where he focused on the price effect of splitting common shares. Since then event studies have being extensively used in measuring impact of a specific event on the value of a firm. In the recent history it has been widely used in impact analyzing of index reconstitution, and listing (delisting) in indices, for example, Shankar (2006) and Liu (2006; 2010).

The main hypotheses offered to explain effects of changes in the index on stock return and volume are categorized into four types. These are:

- price pressure hypothesis
- imperfect substitutes hypothesis or downward-sloping demand curve
- liquidity hypothesis and
- information signaling hypothesis

Various studies have been conducted to analyze the temporary and permanent effects of adding (deleting) from an Index. Shankar (2006) supports the temporary price-pressure hypothesis with regards to changes in S&P SmallCap 600 Index. Liu (2006; 2010) supports this hypothesis where he considers effects of Japanese Nikkei 225 and Nikkei 500 rebalancings. In contrast, Chen (2006) supports the idea of imperfect substitutes hypothesis in explaining the index effect. Here Chen uses data on additions to U.S. Russell indices. Another study which supports this idea of permanent price effects is Yun (2010) which investigates the effects of reconstitution of Korean KOSPI (Korean stock index futures and options) 200 index. Bildik (2008) supports the hypotheses of price-pressure and imperfect substitute. Bildik carried out his study on ISE (Istanbul Stock Exchange).

Almost all of the previous mentioned studies assess the impact of an event occurring multiple times. As far as literature concerns it is hard to find event studies on a one time occurring event. One such example is done by Selvam (2007) with reference to September 11, 2001 terrorist attack in US and its impact on Asian stock markets. He mentions that among the Asian stock markets, Indian stock markets are more resilient than in the past and they recovered sooner from terrorist attacks than other Asian stock markets.

Therefore, our study is going to fill this gap in literature by adding one more example of an event study on an

impact of single event.

Being a relatively new index, S&P SL 20 index has been appearing only recently in literature.

In one of those handful of studies Nandani (2015) proposes two forecasting models for the S&P SL20 index: namely, a 30-10-1 feedforward artificial neural network and an ARIMA(1,1,1) model. Another study by Sooriyakumar (2015) identifies CAPM as an appropriate model to predict the price or returns of assets with regards to S&P SL20 index.

Fernando (2014) analyzed the liquidity formation of S&P SL 20. The main focus of the study was the depth of trading liquidity. They report that three possible influences on depth; timing, market condition and trading volume, has no material impact on trading liquidity of sample stocks.

In a similar study, Piyananda (2014) makes a comparison between daily returns of the two main indices in Colombo Stock Exchange; namely the Standard and Poor's Sri Lanka 20 and All Share Price Index and concludes that there is no statistical difference in variance and mean returns of the two indices. But they suggests that ASPI reports a higher return per unit of risk compared to S&P 20.

Another study by Jeyasreedharan (2015) to examine the days of the week (DoW) effect of S&P SL 20 index indicates that DoW effects were weak during the war period but strong during the post-war period. However, when potential ARCH effects were taken into account, both periods showed evidence of strong DoW effects, indicating the Day-of-the-Week effect to be an anomaly rather than an illusion.

In a related study Wijeweera (2015) establishes that there is a statistically significant relationship between terrorist attacks and financial market performance using Sri Lanka's ASPI and S&P SL 20 indices.

All these studies suggest that S&P SL 20 index is becoming popular and interesting topic for researchers.

1.4 Objectives and Hypotheses

The objectives and relevant hypotheses to answer the research questions of the study are organized are as follows:

Objective 1

It is expected to investigate the price efficiency of the stock added from the index after the date of announcement and before and after the effective date of the change by selecting suitable event windows. This will help to answer RQ1.

Ha_0 =Mean day '0' trade volume is equal to mean trade volume

Ha_1= Mean day '0' trade volume is not equal to mean trade volume

Objective 2

It is expected to investigate the correlation between the returns of the stocks that are added to the index after the date of announcement and before and after the effective date of the change by selecting suitable event windows. This will help to answer RQ2.

We will use t-test for testing the population correlation coefficient ρ.

Hb_0 = There exists no correlation between the returns of the stocks that are added to the index, i.e., $\rho=0$

Hb_1= There exists a correlation between the returns of the stocks that are added to the index, i.e., $\rho\neq0$

Objective 3

It is expected to investigate the correlation between the stocks that are added to the index in the same market segment after the date of announcement and before and after the effective date of the change by selecting suitable event windows. This will help to answer RQ3.

Hc_0= There exists no correlation between the stocks that are added to the index in the same market segment

Hc_1= There exists a correlation between the stocks that are added to the index in the same market segment

Objective 4

It is expected to investigate if there is a correlation between the returns of stocks added to the index and not added stocks in the same market segment after the date of announcement and before and after the effective date of the change by selecting suitable event windows. This will help to answer RQ4.

Hd_0= There is no correlation between the returns of stocks added to the stock and not added stocks in the same market segment

Hd_1= There is a correlation between the returns of stocks added to the stock and not added stocks in the same market segment

Objective 5

It is expected to investigate to what extent the index construction announcement affect the added stock of the index and also to the other stocks in the market after the date of announcement and before and after the effective date of the change by selecting suitable event windows. This will help to answer RQ5.

He_0= There is no causal relationship in the stocks added stock of the index and also to the other stocks in the market

He_1= There is a causal relationship in the stocks added stock of the index and also to the other stocks in the market

2. Method

To understand the impact of earnings surprises on stock prices, and thus to discover if there are any trends or patterns useful for trading, we perform an event study. The event study framework was first introduced by Dolley (1933) where he focused on the price effect of splitting common shares. Mackinlay (1997); Shankar (2006); Liu (2006; 2010); Chen (2006); Yun (2010) and Bildik (2008) are few examples for the vast literature which uses event study methodology in assessing impact of various market events.

An Event study is a statistical method to assess the impact of an event on the value of a firm. The basic idea is to find the abnormal return attributable to the event being studied by adjusting for the return that stems from the price fluctuation of the market as a whole.

We take the launching of the index as our event. Our aim is to check if stock prices after the event display abnormal returns (i.e. returns in excess of their expected return after compensating for risk). The traditional event study methodology of Fama, Fisher, Jensen, and Roll (1969) involves calculating cumulative average abnormal returns ("CAARs").

2.1 Event Study Time Line

Define:

τ=0 as the event date,

$\tau=T_0+1$ to $\tau=T_1$ constitutes the estimation window

$\tau=T_1+1$ to $\tau=T_2$ represents the event window

$\tau= T_2 +1$ to $\tau = T_3$ is the post event window

$L_1 = T_1- T_0$ be the length of the estimation window

$L_2 = T_2- T_1$ be the length of the event window

$L_3 = T_3- T_2$ be the length of the post event window.

An important assumption throughout the event-study methodology is that the event is exogenous with respect to the change in market value of the security.

This study uses launching of S&P SL20 index as the "event" where any occurrence that affects the share price or the value of the firm. Johnson (1998), defined "event date" is the date on which the effect of an event is presumed to take place, or the date around which a diffused effect is presumed to be distributed. The "event date" is the first market date on which the market participants can respond to the event. The "event date" (day 0) is also called as launching of the S&P SL20 index date in this study. It is the market date on which it is publicly announced. This announcement is conveyed to the market participants through the Stock Market Daily (SMD) which is the official publication of the CSE.

In our study we define event window [-20,+20]. Hendricks and Singhal (1996) cite two reasons to use a shorter event period: one, a shorter event period permits a better estimation of the effects of information of stock prices since it reduces the possibility of other confounding factors not related to the announcement. Two, it also increases the power of the statistical tests.

Previous researchers used different lengths of estimation period and event period for their studies. Among them, Brown and Warner (1985), used 250 days (239 days for estimation period and 11 days for event period). Pettit (1972), used 12 month period prior to the dividend announcement date. Bandara (2001), Bandara and Samarakoon (2002), used 200 trading days for the estimation period and 121 trading days for event period. This

study uses 105 trading days for estimation period and 41 trading days for event period.

Daily closing price for the total period of 146 days is included the 105 days of estimation period (-21,-127) and the window period of 41 days. In the literature the estimation period, of size between 120 – 200 days used in most studies, is the period immediately before the event window (Telang, and Wattal, 2005). According to Peterson (1989) typical length of the estimation period ranges from 100 to 300 days for daily studies. A longer estimation period will improve the prediction model while model parameters may become instable.

In order to compute the Expected Returns (ERs) for the event period, it is required to estimate test parameters for Beta (β) and Alpha (α). The estimation period starts with -21 day from the event date and it goes back to 105 trading days. It is identified as -127 day to -21 day. All the days referring to the estimation period must be trading days. The event period goes back to 20 trading dates and immediately after the event date again it goes up to 20 trading dates. Therefore, totally it consists of 21 trading dates. Typical lengths of the event period range from 21 to 121 days for daily studies (Peterson, 1989).

Finally, the total period to be reviewed is 146=(105+41) trading days which is considered as the analysis period. It is important to identify the behavior of ARs to compare with the actual stock returns and expected stock returns surrounding the dividend announcement date.

2.2 Event Study Process

Step 1: Calculate daily abnormal returns ("ARs") for each firm in the days surrounding the event being studied. Daily ARs can be calculated using various benchmarks:

1. Market-adjusted-return model (M1)
2. Mean-adjusted-return model (M2)
3. Risk-adjusted-return model (M3)

In stock market trading, abnormal returns are the differences between a single stock or portfolio's performance and the expected return over a set period of time.

Browner and Warner (1985) suggest the use of a value-weighted index as a market index. We use All Share Price Index (ASPI) as the benchmark for expected return which is according to CMIC (2013) a value-weighted index.

Abnormal Return = Actual Return – Expected Return

$$AR_{(i,t)}=R_{(i,t)}-E(R_{(i,t)}) \quad (1)$$

Step 2: Calculate the average abnormal return ("AAR") for each day in the event window.

This aggregates the abnormal returns for all N stocks to find the average abnormal return at each time t. This helps eliminate idiosyncrasies in measurement due to particular stocks.

$$AAR_t=1/N \ \ \Sigma^{N}_{i=1} AR_{(i,t)} \quad (2)$$

Step 3: Finally, sum the average abnormal returns over the T days in the event window (i.e. over all times t) to form the cumulative average abnormal return (CAAR).

$$CAAR_T=\Sigma^{T}_{t=1} AAR_t \quad (3)$$

2.3 Models for Measuring Normal Performance

$$AR_{it}=R_{it}-(\alpha_i+\beta_i R_{mt}) \quad (4)$$

Following three models will be used for measuring the normal performance of the market.

2.3.1 Mean-Adjusted Return Model (M2)

Here the expected return of a security is equal to a constant, estimated by averaging the series of past returns over the pre-identified estimation window. It assumes that the expected return of a security is equal to its historical mean. i.e. α_i= average return over the estimation period (historical mean of the stock) and β=0. This does not account for market-wide factors. This model has been used by Kalay and Loewenstein (1985) and Mackinlay (1997).

2.3.2 Risk-Adjusted Return Model (M3)

$$R_{it}=\alpha_i+\beta_i R_{mt}+\xi_{it} \quad (5)$$

where $E(\xi_{it})=0$,$var(\xi_{it})=\sigma_{\xi}^2$. The market model represents a potential improvement over the constant-mean-return model. By removing the portion of the return that is related to variation in the markets return, the variance of the abnormal return is reduced.

Compared to the Market-Adjusted and Mean-Adjusted models, this model is more sophisticated as it accounts for both market wide and firm specific factors of each security.

The OLS estimators of the market-model parameters using an estimation window of L_1 observations are

$$\hat{\beta}_i = \frac{\sum_{\tau=T_0+1}^{T_1}(R_{i\tau}-\hat{\mu}_i)(R_{m\tau}-\hat{\mu}_m)}{\sum_{\tau=T_0+1}^{T_1}(R_{m\tau}-\hat{\mu}_m)^2} \quad (6)$$

$$\hat{\alpha}_i = \hat{\mu}_i - \hat{\beta}_i\,\hat{\mu}_m \quad (7)$$

$$\sigma_{\xi_i}^2 = \frac{1}{L_1-2}\sum_{\tau=T_0+1}^{T_1}\left(R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i\,R_{m\tau}\right)^2 \quad (8)$$

where

$$\hat{\mu}_i = \frac{1}{L_1}\sum_{\tau=T_0+1}^{T_1} R_{i\tau} \quad (9)$$

and

$$\hat{\mu}_m = \frac{1}{L_1}\sum_{\tau=T_0+1}^{T_1} R_{m\tau} \quad (10)$$

R_{it} and R_{mt} are the return in event period for security i and the market respectively.

2.3.3 Market-Adjusted-Return Model (M1)

Setting $\alpha_i=0,\beta_i=1$ we have $\xi_{it}=R_{it}-R_{mt}$ as the market-adjusted-return. This is feasible when estimation window is not available but should be used with caution.

The underlying assumption in this model is that the expected returns of a security is equal to the market return. Thus, it considers that the expected return is constant across securities but not across time. The model only accounts for market wide movements, which occur at the same time that the sampling firms experience the event. Consequently, all market-wide movements are eliminated from the stock returns when deriving the excess returns on and around the event. Model may appeal to the average investor who looks for strategies of above market returns in managing their portfolios. However, in general, scholars consider this model as a restricted one as it is mostly applied in situations where availability of data is limited. Scholars like DeBont and Yonesava (1985) and Gunaratne (2009) have employed this model to estimate the excess returns in different contexts.

2.4 Hypothesis Testing: P-Value Approach

We used p-value approach in Hypothesis testing. Following are the steps followed in this procedure:

1) Specify the null and alternative hypotheses.
2) Using the sample data and assuming the null hypothesis is true, calculate the value of the test statistic.
3) Using the known distribution of the test statistic, calculate the p-value.
4) Set the significance level, α. Compare the p-value to α. If the p-value is less than (or equal to) α, reject the null hypothesis in favor of the alternative hypothesis. If the p-value is greater than α, do not reject the null hypothesis.

2.4 Data Collection

For our study, we obtained daily volume figures and closing stock prices of the ASPI index and S&P SL 20 Index and performance of 16 listed companies (Table 1) in the Index since the beginning for the period between June 2009 and June 2015. The data was obtained from Colombo Stock Exchange website at https://www.cse.lk/historical_trades.do. This study period contains 1378 daily observations (open, high, low, close, trade volume, share volume and turn over) for each company excluding the weekends and holidays.

We will be using the Eviews 6 in the preliminary analysis of the data and hypotheses testing. The event study will be carried out using the Matlab 2007.

3. Results

3.1 Statistics and Data Analysis

The mean, standard deviation, skewness and kurtosis of the log returns for each of the 16 companies were calculated for the whole period and then for the periods before and after constructing the index as shown in Table

2. We can see that the mean is approximately equal to one for the whole period, period before and after, but mean is slightly larger for before event period than the after event period. Standard deviation is nearly 0.01 for the three periods considers, but usually larger in the before event period.

We have more than 3 for kurtosis for most of the companies, especially prior to the event, therefore the distributions are more peaked. Only Commercial Bank, Cargills, Nestle and Ceylon Tobacco has significant kurtosis in the after event period. For almost all of the companies in the three periods considered, the skewness is between -1 and 1 (except for Nestle and Tobacco) so the distributions are symmetrical.

From above observations we can see that the daily stock return for an individual security exhibits substantial departures from normality. The evidence generally suggests that distributions of daily returns are fat-tailed relative to a normal distribution (Fama, 1976, p. 21).

Figure 1 graphs the stock prices of the 16 companies during the event period. The daily closing pricings during the event window for most of the companies shows a level trend except for DFCC (which has an upward trend) and TELECOM (which shows a small peak around the event). Other than that the prices exhibit no apparent radical movement on the event day.

However, the average daily percentage return of these sixteen listed companies, seen in Figure 2, did exhibit common movement on that day. The event day records the lowest (positive) average daily return for the sixteen companies during the total 41 days in the event window.

As the Figure 3 further points out, at the event day occurs the highest total share volume (nearly 70 million blocks traded) – a volume five times larger than the next largest share volume, during the event window.

Figure 4 graphs the total trade volume of the sixteen companies during event window. One can see although at the event day there's a small local peak, there is an overall decreasing trend (with oscillations).

To quantify this we will test the following hypotheses in Objective 1:

Ha_0 =Mean day '0' trade volume is equal to mean trade volume

Ha_1= Mean day '0' trade volume is not equal to mean trade volume

We use the test statistic:

$$t=(x\ \square-\mu)/SE \tag{11}$$

where SE =sd(x)/ √ n and n is the number of samples.

With mean trade volume 360.2927 and t- statistic -4.8548 we can reject the null hypothesis Ha_0 at the 0.05 significance level (p-value 1.000).

We can answer "RQ1: Is there a change of the price efficiency when the stock is included to the index?" in affirmation. There is evidence that a change of the price efficiency is happened when the index is introduced.

Now we will test the hypothesis

$Hb_0 = \rho=0$ vs. $Hb_1= \rho\neq0$

We use the test statistic:

t=(r √ (n-2))/ √ (1-r^2)

where r is the correlation coefficient.

We have r=-0.2584 and t-statistic -1.0614 (p-value is 0.8491>0.05) and we cannot reject the null hypothesis. There is sufficient statistical evidence at the $\alpha = 0.05$ level to conclude that there is no significant correlation between the returns before and after the event of the stocks that are added to the index. That is the patterns of the prices are different before and after the introduction of the index.

Next we will consider the correlation between the returns of the stocks that are added to the index. The correlation coefficient and p-values between the sixteen companies are shown in Tables 3 and 4, respectively.

As Table 4 highlights there are few significant correlations among the sixteen companies at significance level 0.01. When we consider sector breakdown as shown in Table 5 most of these correlations are due to being part of the same sector. For example, Commercial Bank, DFCC, NDB all belong to (Banking, Finance and Investment) BFI sector all correlated significantly. Also, Bukit which also involves in food manufacturing shows significant correlation with other companies from Beverage, Food and Tobacco (BFT) sector: Distillieries and Nestle. John Keells which also involves in Investment sector shows significant correlation with NDB which is from BFI industry. So most of this correlation is due to being part of the same sector, and others can be discarded as to

mere coincidence.

We can answer "RQ2: Does a significant correlation exist between the returns of stocks that are added to the index?" yes, mostly due to being part of the same sector, which assertion we will be investigating next in more detail.

It is expected to investigate the correlation between the stocks that are added to the index in the same market segment after the date of announcement and before and after the effective date of the change by selecting suitable event windows.

Hc_0= There exists no correlation between the stocks that are added to the index in the same market segment

Hc_1= There exists a significant correlation between the stocks that are added to the index in the same market segment

Table 5 shows the sector breakdown of the S&P SL 20 Index.

As the Table 6 lists out we can see that there is significant correlation between the stocks that are added to the index in the same market segment in some of the segments of concern at the significance level 0.01.

So we can answer "RQ3: Does a significant correlation exist between the stocks that are added to the index in the same market segment?" as only to some extent.

As the fourth objective, it is expected to investigate if there is a correlation between the returns of stocks added to the index and not added stocks in the same market segment after the date of announcement and before and after the effective date of the change by selecting suitable event windows.

Hd_0= There is no correlation between the returns of stocks added to the index and not added stocks in the same market segment

Hd_1= There is a correlation between the returns of stocks added to the index and not added stocks in the same market segment

As the Table 7 lists out we can see that there is evidence to reject the null hypothesis that there exists no significant correlation between the stocks the returns of stocks added to the index and not added stocks in the same market segment in all the segments of concern at the significance level 0.05. Figure 6 further emphasize this which shows very strong positive correlation in Oil Palms and BFT sectors and strong positive correlation in Telecommunication and BFI sectors. Diversified and Manufacturing sectors also show moderate positive correlation at the significance level 0.05.

Now we can answer the question:

RQ4: Is there a correlation between the returns of stocks added to the index and not added stocks in the same market segment? Yes. There exists significant correlation between the stocks that are added and not added in the same market segment, which shows that index represents market behavior.

It is expected to investigate to what extent the index construction announcement affect the added stock of the index and also to the other stocks in the market after the date of announcement and before and after the effective date of the change by selecting suitable event windows.

He_0= There is exists no correlation between the stocks added stock of the index and also to the other stocks in the market

He_1 = There is exists a correlation between the stocks added stock of the index and also to the other stocks in the market

Figure 9 is a graph of ASPI returns vs. sixteen companies' average returns for the 41 days in the event window. The line drawn through these plots reflects the sample returns that would be expected, given a market return on a specific day and the average sample beta 0.6831. The data point of day 0 which is indicated in black square is not that significant from zero and lies near expected value.

We selected 5 companies (Note 1) from the CSE which are never listed in S&P SL 20 but have next highest market capitalization to compare against the listed companies' performance (see Table 10).

As Figure 10 shows there is no common movement on the event day in the stocks of the selected 5 companies. However, as the Figures 11 to 13 illustrate there is some strange behavior on the event day (day 21 in the figures). Average daily return is largely negative (minimum for the 41 days in the event window) and also total share volume is very low during the event day. This shows that there was some impact on the nonlisted companies in the S&P SL 20 from the launching of the index.

Figures 14, 15, 16 and 17 shows the average abnormal returns (AAR), cumulative average abnormal returns (CAAR), error for the CAAR and t-statistic, respectively, for the average returns of the selected companies from S&P SL20 index for the three market models: M1, M2 and M3.

According to Figure 14 AAR is the lowest at the event day with reference to all three model. Figure 15 further emphasize this fact by showing overall downward trend in the cumulative average abnormal returns. Figure 16 indicates that the error is within ±0.15 and Figure 17 shows that the t-statistic is also insignificant.

We further see that the S&P SL20 index and ASPI index moves unison after the event by plotting the values and returns (Figure 18) and the CAARs (Figure 19) for the two indices for the 621 trading days following the examination period. This can be explained as S&P SL 20 Index market capitalization is 77,629.45 LKR millions (Note 2) which is nearly 52.95% of the total market cap (S&P, 2015) and so it truly represents the total market behavior (Note 3).

Table 1. The mean, standard deviation, kurtosis of the log returns for each of the 16 companies for the whole period, and for the periods before and after constructing the S&P SL20 index

Company Name	Symbol	Market Capitalisation (Rs.)	Market Cap/Total Market Cap (%)	Beta Values Against S&P SL20 (As of First Quarter of year 2015)
ACCESS ENGINEERING PLC*	AEL.N0000	0.00	0.00	1.10
AITKEN SPENCE PLC	SPEN.N0000	40,640,204,800.00	1.50(%)	0.92
BUKIT DARAH PLC	BUKI.N0000	67,840,200,704.00	2.50(%)	0.54
CARGILLS (CEYLON) PLC	CARG.N0000	31,920,001,024.00	1.17(%)	0.06
CARSON CUMBERBATCH PLC	CARS.N0000	78,554,767,360.00	2.89(%)	0.88
CEYLON TOBACCO COMPANY PLC	CTC.N0000	166,755,598,336.00	6.14(%)	0.79
CHEVRON LUBRICANTS LANKA PLC	LLUB.N0000	49,103,998,976.00	1.81(%)	0.86
COMMERCIAL BANK OF CEYLON PLC	COMB.N0000	139,377,967,104.00	4.74(%)	1.46
DFCC BANK PLC	DFCC.N0000	52,515,852,288.00	1.78(%)	0.93
DIALOG AXIATA PLC	DIAL.N0000	92,024,692,736.00	3.13(%)	1.62
DISTILLERIES COMPANY OF SRI LANKA PLC	DIST.N0000	84,360,003,584.00	2.87(%)	0.62
HATTON NATIONAL BANK PLC	HNB.N0000	71,074,545,664.00	2.41(%)	0.99
JOHN KEELLS HOLDINGS PLC	JKH.N0000	220,017,688,576.00	7.47(%)	1.15
LANKA ORIX LEASING COMPANY PLC*	LOLC.N0000	50,608,799,744.00	1.72(%)	0.88
LION BREWERY CEYLON PLC*	LION.N0000	50,007,998,464.00	1.70(%)	0.84
NATIONAL DEVELOPMENT BANK PLC	NDB.N0000	45,421,019,136.00	1.55(%)	1.13
NESTLE LANKA PLC	NEST.N0000	108,256,804,864.00	3.68(%)	0.36
PEOPLE'S LEASING & FINANCE PLC*	PLC.N0000	39,338,573,824.00	1.34(%)	1.21
SAMPATH BANK PLC	SAMP.N0000	45,318,230,016.00	1.54(%)	0.89
SRI LANKA TELECOM PLC	SLTL.N0000	88,438,136,832.00	3.01(%)	0.38

Note. Companies indicated by * mark are excluded from the calculations as they did not appear in the initial list.

Table 2. The mean, standard deviation, kurtosis of the log returns for each of the 16 companies for the whole period, and for the periods before and after constructing the S&P SL20 index

Company	Total				Before				After			
Name	Mean	SD	Kurtosis	Skewness	Mean	SD	Kurtosis	Skewness	Mean	SD	Kurtosis	Skewness
Aitken Spence	0.9999	0.0126	5.5219	0.4669	0.9996	0.0118	2.9023	-0.1402	1.0000	0.0127	5.8127	0.5425
Bukit Darah	0.9996	0.0158	6.4612	0.5141	0.9978	0.0258	1.6965	0.1959	0.9998	0.0134	7.8921	0.9356
Cargills	0.9997	0.0193	4.1898	-0.0804	0.9971	0.0222	5.1513	-0.9154	1.0001	0.0187	3.6578	0.1813
Carson	0.9998	0.0177	4.0188	0.4386	0.9989	0.0168	1.7816	-0.7955	0.9999	0.0178	4.2833	0.6110
Chevron	1.0011	0.0130	13.7524	0.8098	1.0001	0.0100	0.9318	0.3971	1.0013	0.0134	13.9351	0.8131
Commercial	1.0006	0.0106	5.9833	-0.4991	0.9999	0.0080	9.8505	0.9332	1.0008	0.0109	5.5968	-0.5976
DFCC Bank	1.0008	0.0136	2.8751	0.2710	0.9998	0.0133	0.6312	-0.0570	1.0010	0.0136	3.2135	0.3224
Dialog	1.0006	0.0159	7.9837	-0.0128	0.9980	0.0188	0.8390	-0.1141	1.0010	0.0154	10.2914	0.0603
Distilliers	1.0008	0.0132	3.6349	0.7011	0.9989	0.0165	2.0283	0.3957	1.0011	0.0125	4.0776	0.8436
HNB	1.0006	0.0128	3.3041	-0.0317	1.0001	0.0190	1.1679	-0.3191	1.0007	0.0115	3.3493	0.2088

John Keels	1.0002	0.0128	7.1115	-0.5767	1.0010	0.0138	2.3780	-0.2870	1.0001	0.0126	8.1794	-0.6447
NDB	1.0010	0.0143	6.7718	0.3644	0.9978	0.0154	2.1696	-0.4475	1.0015	0.0140	7.7797	0.5639
Nestle	1.0013	0.0199	12.3293	1.3414	1.0026	0.0290	7.3792	0.8100	1.0012	0.0183	12.7080	1.4867
Sampath Bank	1.0005	0.0119	4.5843	0.4660	0.9981	0.0160	4.0935	0.5101	1.0009	0.0110	4.0012	0.5476
Telecom	1.0002	0.0182	1.7926	0.1715	0.9986	0.0242	0.9739	-0.1326	1.0004	0.0170	1.6264	0.3513
Tobacco	1.0010	0.0192	11.9133	1.1234	1.0027	0.0226	19.9903	3.1005	1.0008	0.0186	8.6475	0.5322

Table 3. Correlation coefficients for the returns of the 16 companies presented in the S&P SL 20 index

	AITKEN	BUKIT	CARGILLS	CARSON	CHEVRON	COMBANK	DFCC	DIALOG	DISTILLIERIES	HNB	TOBACCO	KEELLS	NDB	NESTLE	SAMPATH
BUKIT	0.12053														
CARGILLS	0.21693	-0.03565													
CARSON	0.06485	0.46703	0.18668												
CHEVRON	-0.00329	0.28492	-0.41469	0.14312											
COMBANK	0.23257	0.11807	0.17367	0.05649	0.17514										
DFCC	0.05918	-0.11813	-0.01463	-0.13163	0.01767	0.50162									
DIALOG	0.07418	0.57839	0.07000	0.34626	0.26540	0.22079	0.04295								
DISTILLIERIES	-0.05835	0.50382	0.23979	0.28325	0.32934	0.07671	-0.00774	0.28703							
HNB	-0.08464	0.05880	0.08923	0.14038	0.11828	0.11922	0.12751	-0.03476	0.13461						
TOBACCO	-0.07221	0.10812	0.27280	0.05274	-0.00850	0.22936	0.17363	0.21256	0.24781	-0.01076					
KEELLS	-0.06353	0.25793	0.09775	0.07542	0.32819	0.50786	0.18355	0.38748	0.22144	0.01697	0.28511				
NDB	-0.13456	0.14745	0.01937	0.31690	0.19362	0.49229	0.24327	0.18344	0.19059	0.10749	0.16362	0.59262			
NESTLE	0.00990	0.45589	0.12130	0.67132	0.07693	0.18452	-0.08269	0.40117	0.14520	-0.02928	0.16423	0.22505	0.30535		
SAMPATH	0.16850	-0.11227	0.17285	-0.09719	0.06429	0.33835	-0.01412	-0.03905	-0.01292	0.17840	0.06030	0.31645	0.30671	-0.15467	
TELECOM	-0.03188	0.12539	0.09051	0.23248	-0.05425	0.32056	0.06491	-0.02741	0.08516	0.03118	0.10434	0.11996	0.23712	0.18743	0.11931

Table 4. P-values (<0.01) for the returns of the 16 companies presented in the S&P SL 20 Index

	AITKEN	BUKIT	CARGILLS	CARSON	CHEVRON	COMBANK	DFCC	DIALOG	DISTILLIERIES	HNB	TOBACCO	KEELLS	NDB	NESTLE	SAMPATH
	DH	Oil	BFT	DH	Manu	BFI	BFI	Tele	BFT	BFI	BFT	DH	BFI	BFT	BFI
BUKIT	Oil														
CARGILLS	BFT														
CARSON	DH	0.00238													
CHEVRON	Manu		0.0078												
COMBANK	BFI														
DFCC	BFI					0.0009754									
DIALOG	Tele	9.26E-05													
DISTILLIERIES	BFT	0.000919													
HNB	BFI														
TOBACCO	BFT														
KEELLS	DH					0.0008219		0.0135							
NDB	BFI					0.0012522						5.60E-05			
NESTLE	BFT	0.003113		2.12E-06				0.0103							
SAMPATH	BFI														
TELECOM	Tele														

Table 5. Sector breakdown of the S&P SL 20 Index

Company Name	Main Sector
AITKEN SPENCE PLC	Diversified Holdings
BUKIT DARAH PLC	Oil Palms
CARGILLS (CEYLON) PLC	Beverage Food and Tobacco (BFT)
CARSON CUMBERBATCH PLC	Diversified Holdings
CEYLON TOBACCO COMPANY PLC	Beverage Food and Tobacco (BFT)
CHEVRON LUBRICANTS LANKA PLC	Manufacturing
COMMERCIAL BANK OF CEYLON PLC	Bank Finance and Insurance (BFI)
DFCC BANK PLC	Bank Finance and Insurance (BFI)

DIALOG AXIATA PLC	Telecommunications
DISTILLERIES COMPANY OF SRI LANKA PLC	Beverage Food and Tobacco (BFT)
HATTON NATIONAL BANK PLC	Bank Finance and Insurance (BFI)
JOHN KEELLS HOLDINGS PLC	Diversified Holdings
NATIONAL DEVELOPMENT BANK PLC	Bank Finance and Insurance (BFI)
NESTLE LANKA PLC	Beverage Food and Tobacco (BFT)
SAMPATH BANK PLC	Bank Finance and Insurance (BFI)
SRI LANKA TELECOM PLC	Telecommunications

Table 6. Correlation coefficients (p-values <0.01 are highlighted) for the returns for the sectors presented in the S&P SL 20 Index

	DH	BFI	BFT	Oil Palms	Telecommunications
BFI	0.366309				
BFT	0.468065	0.176688			
Oil Palms	0.426317	0.02737	0.442072		
Telecommunications	0.373247	0.251619	0.407854	0.446595	
Manufacturing	0.25686	0.176935	-0.02834	0.284916	0.113172

Table 7. Correlation coefficient r, t-statistic and p-value for the returns of stocks added to the index and not added stocks in the same market segment for the sectors presented in the S&P SL 20 Index

Sector	r	t-statistic	p-value
Diversified Holdings	0.4095	1.9046	0.0360
BFI	0.7026	4.1894	2.4861e-04
BFT	0.8738	7.6227	1.7044e-07
Oil Palms	0.9167	9.7341	4.0551e-09
Telecommunication	0.7818	5.3187	1.9603e-05
Manufacturing	0.4109	1.9122	0.0355

Table 8. Selected 5 companies from CSE from each sector with their market cap (as at 23rd October 2015)

Company	Sector	Market Cap.(as a % of Total Market Cap.)
HEMAS HOLDINGS PLC	Diversified Holdings	1.65
CEYLINCO INSURANCE PLC	BFI	0.95
CEYLON COLD STORES PLC	BFT	1.30
SHALIMAR (MALAY) PLC	Oil Palms	0.55
TEXTURED JERSEY LANKA PLC	Manufacturing	0.76

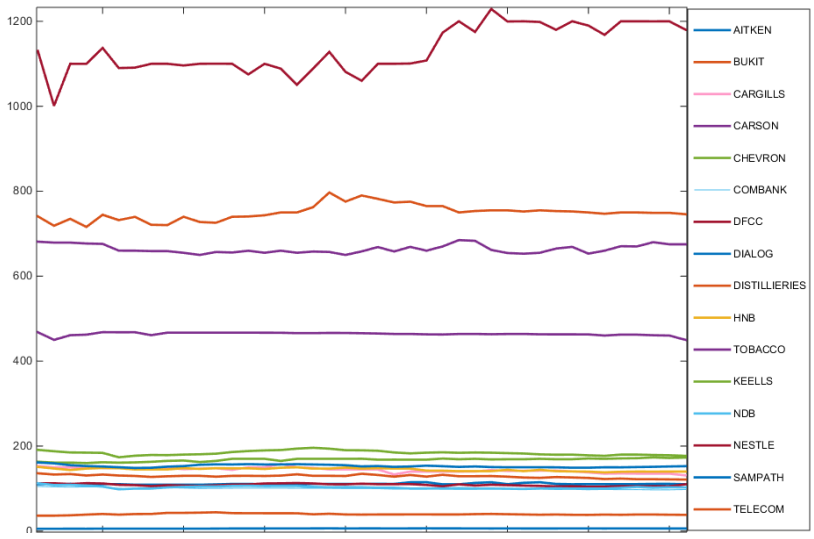

Figure 1. Daily (closing) stock prices of the 16 companies during the event window

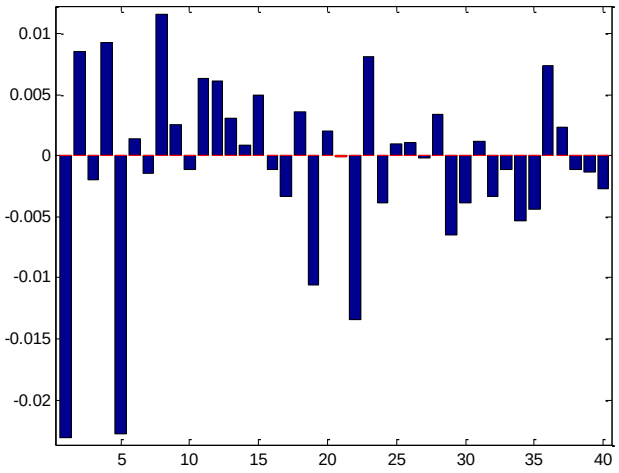

Figure 2. Average daily returns of the 16 companies during the event window

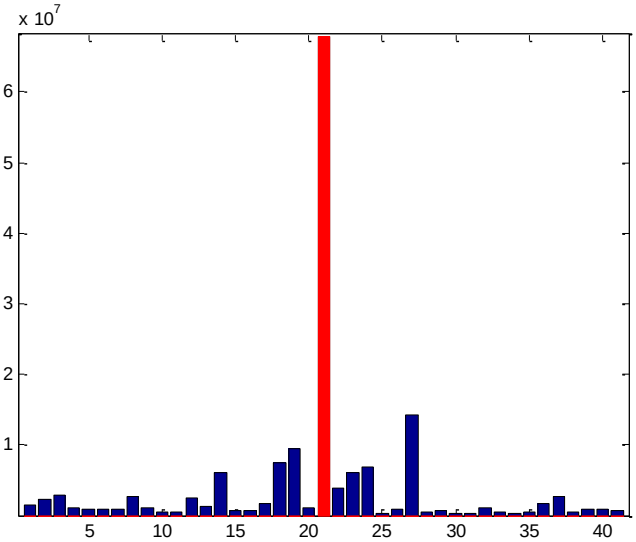

Figure 3. Share volume of the 16 companies during the event window

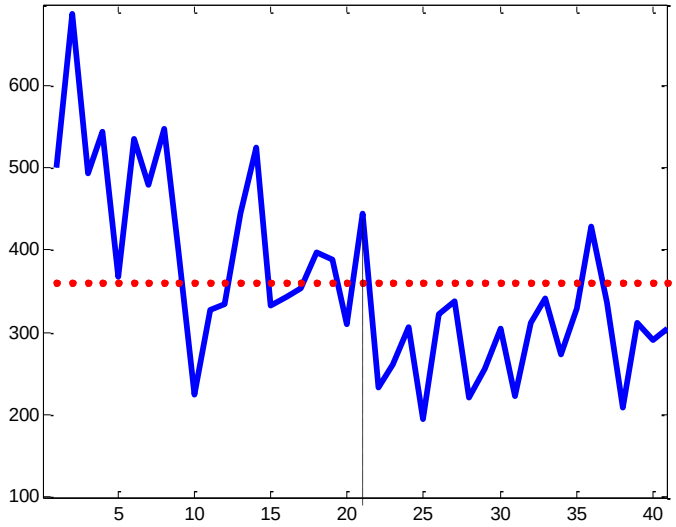

Figure 4. Trade volume of the 16 companies during the event window

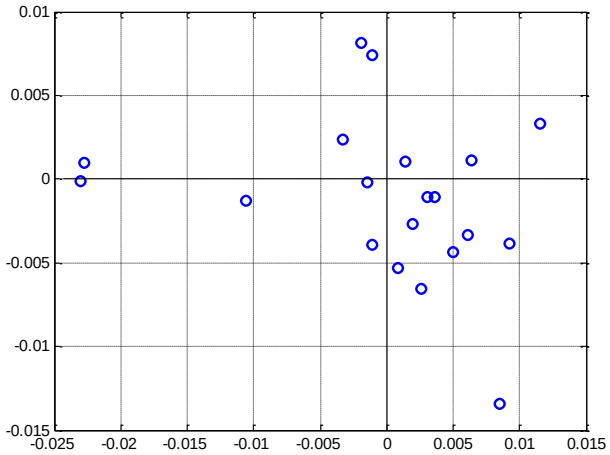

Figure 5. Correlation graph for returns of the added stocks before and after the event

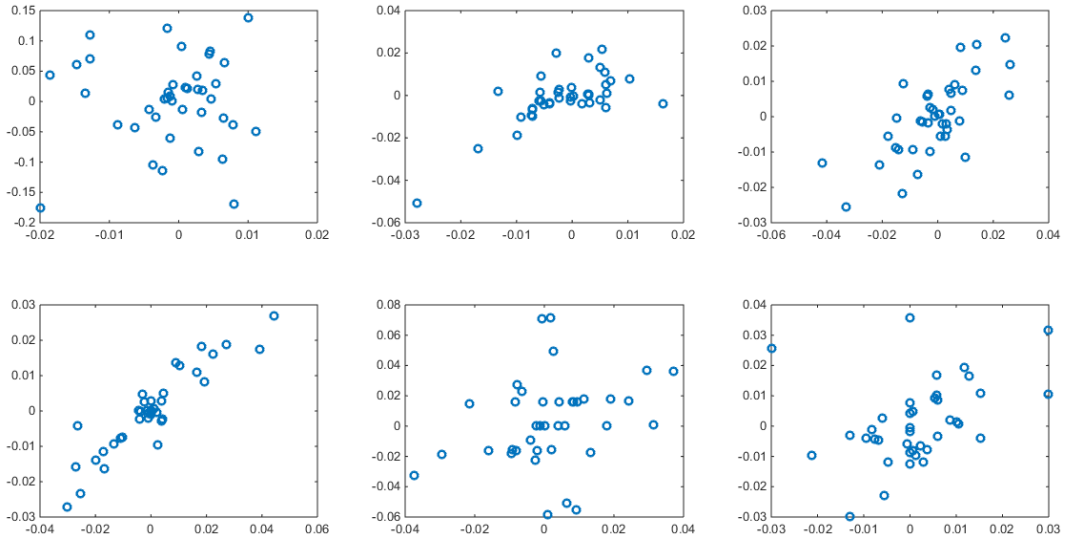

Figure 6. Correlation graphs for the returns of stocks added to the index and not added stocks in the same market segment for the sectors presented in the S&P SL 20 Index

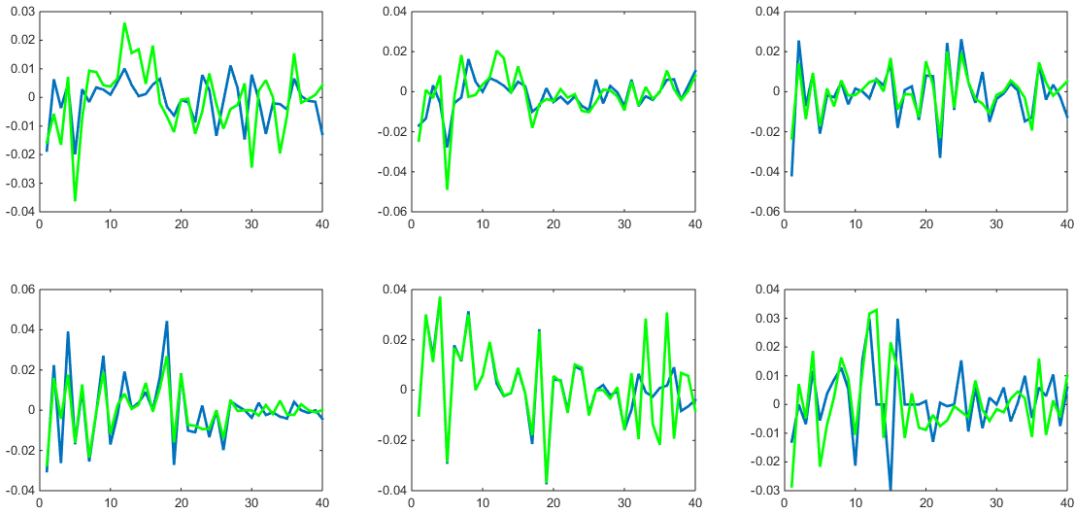

Figure 7. Returns of stocks added to the index and not added stocks in the same market segment for the sectors presented in the S&P SL 20 Index. (blue: stocks in S&P SL 20, green: stocks not in S&P SL 20)

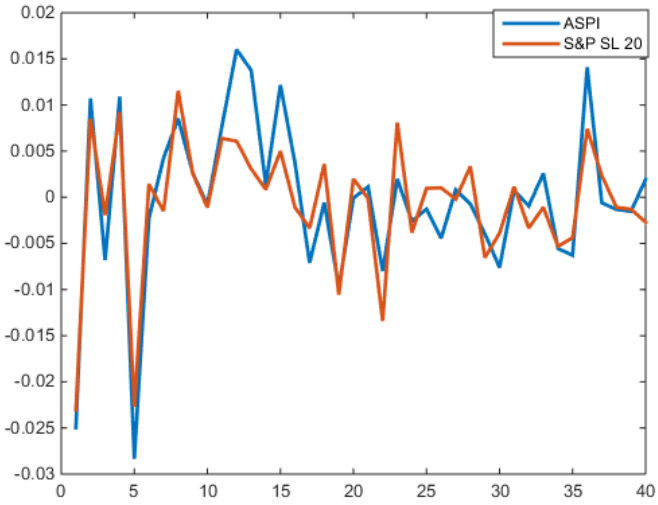

Figure 8. 16 companies' returns and ASPI returns during the event window

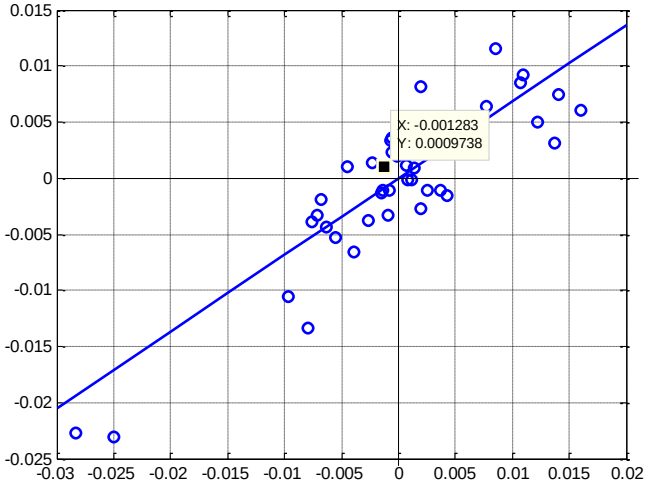

Figure 9. 16 companies returns vs. ASPI returns during the event window. [Square is the data point relevant to event day]

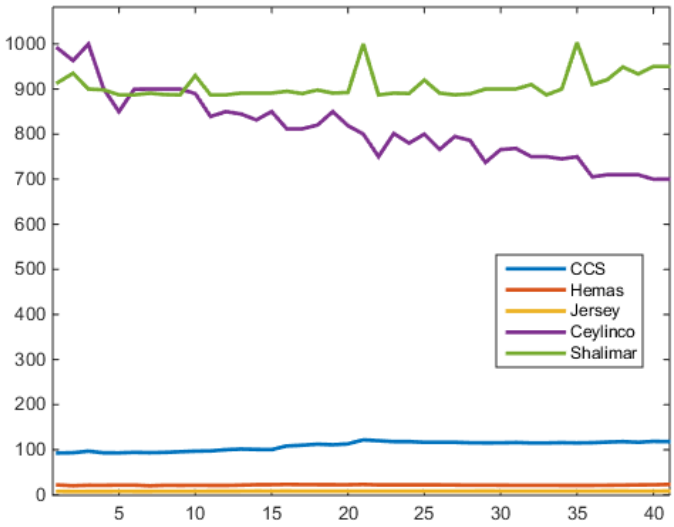

Figure 10. Daily closing stock prices of the selected 5 companies from CSE from each sector during the event window

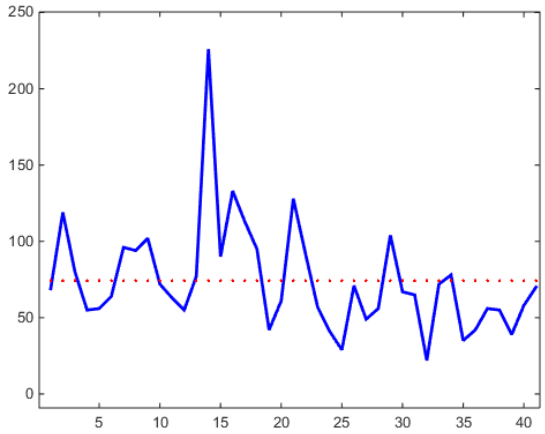

Figure 11. Trade volume of the selected 5 companies from CSE from each sector during the event window

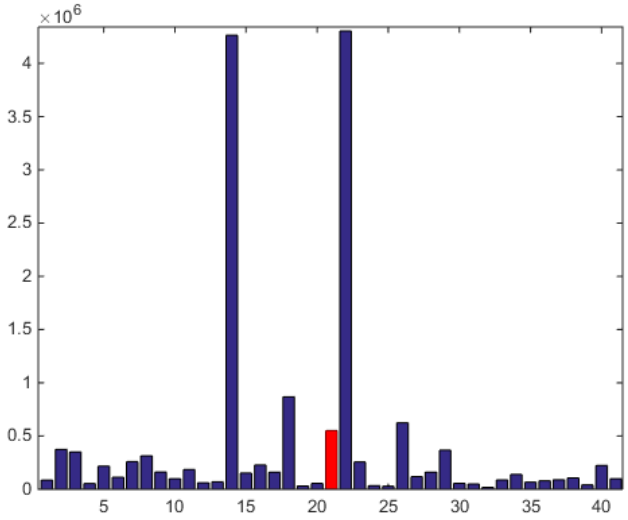

Figure 12. Share volume of the selected 5 companies from CSE from each sector during the event window

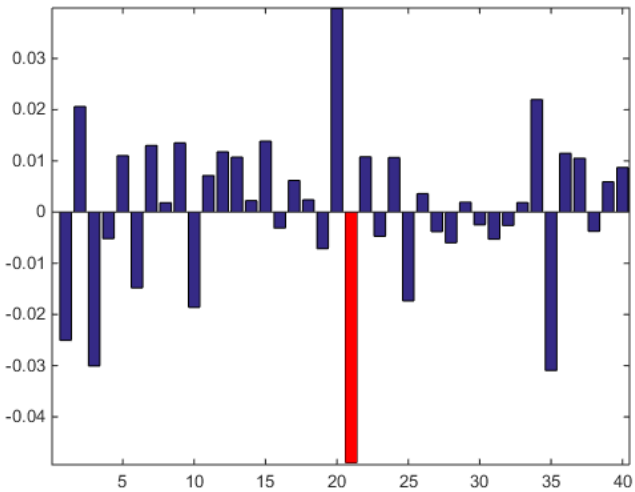

Figure 13. Average daily return of the selected 5 companies from CSE from each sector during the event window

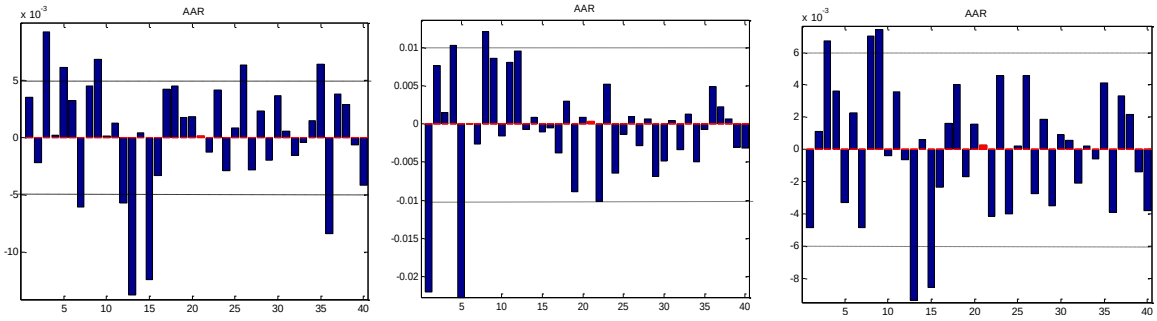

Figure 14. AARs for the average returns of the selected companies from S&P SL20 index for the three market models: M1, M2 and M3. (In red: Event day 21th day.)

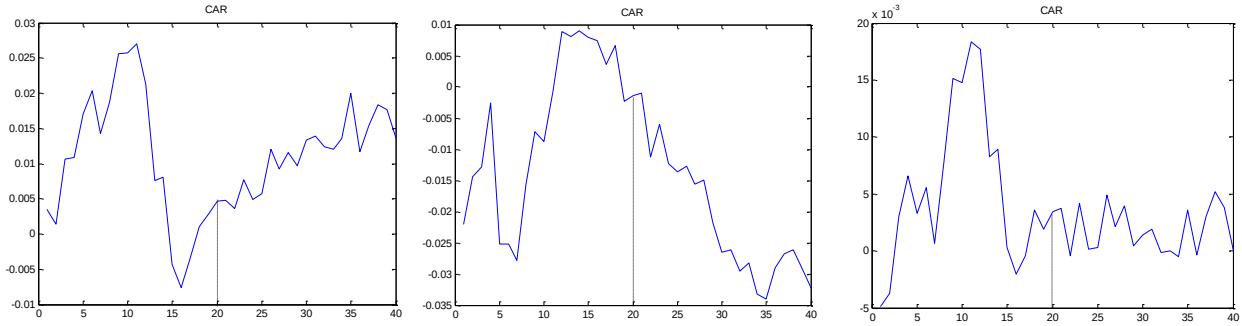

Figure 15. CAARs for the average returns of the selected companies from S&P SL20 index for the three market models: M1, M2 and M3. (Event day is the 20th day.)

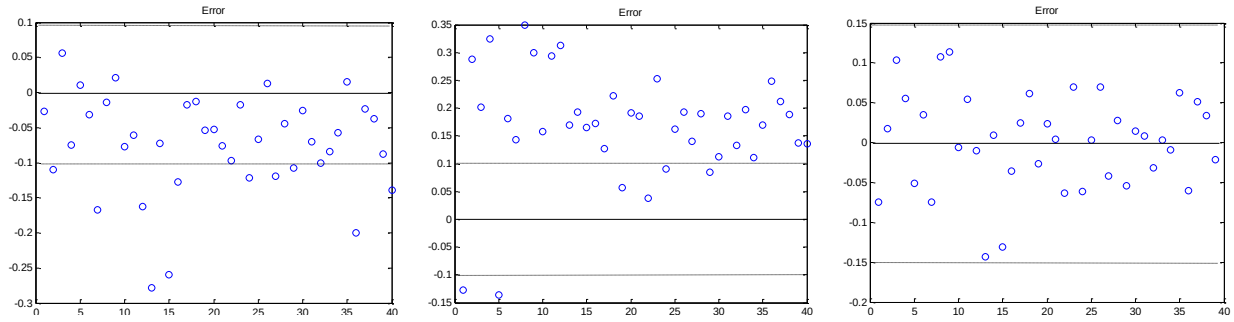

Figure 16. Error graphs for the CAAR for the average returns of the selected companies from S&P SL20 index for the three market models: M1, M2 and M3

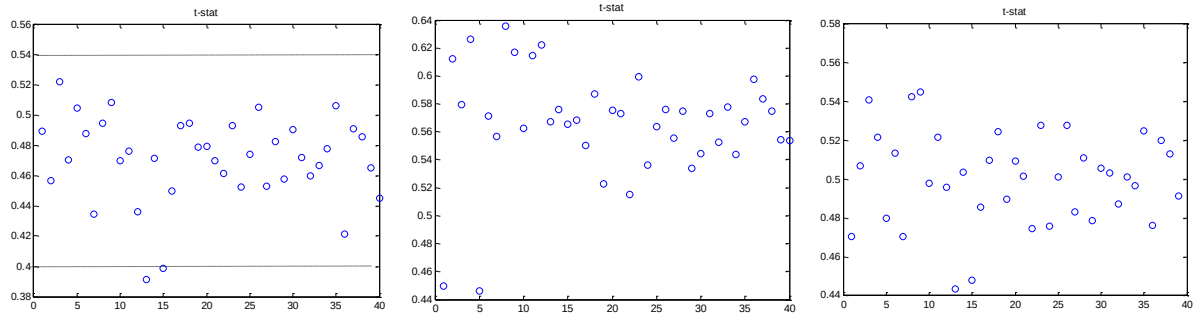

Figure 17. t-statistic for the average returns of the selected companies from S&P SL20 index for the three market models: M1, M2 and M3

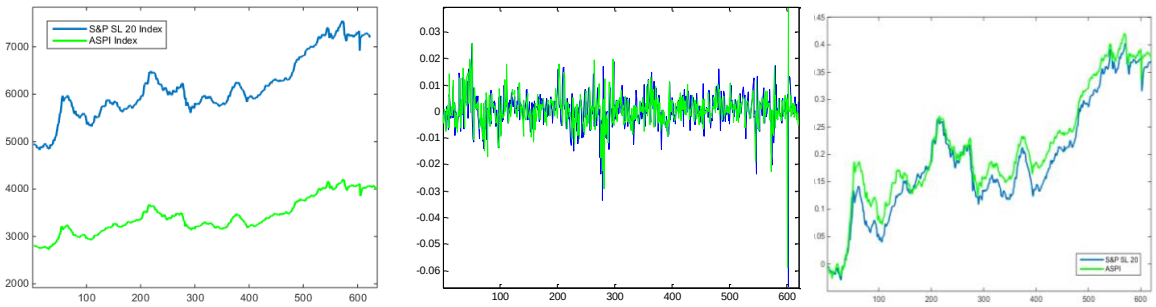

Figure 18. Values, Returns and cumulative log returns for the S&P SL20 index (green) and ASPI index (blue) immediately after the event for 621 trading days

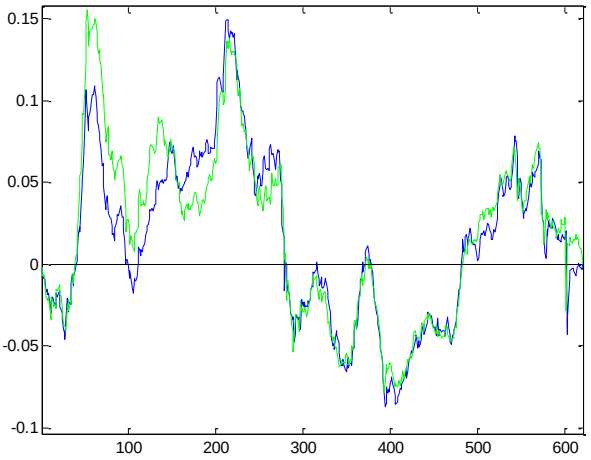

Figure 19. CAAR for the S&P SL20 index (green) and ASPI index (blue) using the market model M3 immediately after the event for 621 trading days

4. Discussion

The following are the important findings of the study:

1) The listed companies in S&P SL 20 index reacted positively (Figure 14: Abnormal Returns) on the day of the launching of the index, 26th of June, 2012. But the reaction is less enthusiastic and after the launch they settled into a negative trend. (Figure 15, Figure 17: Negative Cumulative Abnormal Returns and t-statistic).
2) Share volume and trade volume (Figures 3 and 4, respectively) on the event day is further emphasize the fact that investors were not ready to trust the new index. In fact, they acted negatively to the launching of the index by selling their shares.
3) Also the returns during the event window is not significant as Figure 9 shows their mean values is not significant from zero.
4) Market behavior is reflected in the S&P SL20 Index (Figure 18) and this index has no enhancement over the ASPI.
5) Further there is a change of the price efficiency when the stock is included to the index.
6) Correlation exist between the returns of stocks that are added to the index to some extent, mostly due to being part of the same sector.
7) There is some correlation exist between the stocks that are added to the index in the same market segment.

It is verified from the findings that launching of the S&P SL 20 index has less impact on the listed companies, than expected. The launch itself was not a clear signal to the market regarding the amount and quality of the future analysis and reportage.

Further, in the long run investors acted positively to the launching. In today's information economy, news

spreads rapidly and has the potential to have serious consequences in a very short time. But as an emerging market Colombo Stock Exchange and its indices are less prone to act accordingly. The investors' reaction was lukewarm to the startup of the S&P SL 20 index.

We have investigated the impact of the single event, namely: launching of the S&P SL 20 index. However, we have to leave out a huge part of prior data for estimation period due to the huge variance in the data, which we suggest due to the 'post-war boom'. Therefore, that would be an interesting event to study itself.

Also we neglected the yearly listing (delisting) occurs in the S&P SL 20 Index, and one can analyze the impact of that series of events and information content of them in depth, in a future study.

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Notes

Note 1. From each sector, except telecommunications sector. Because there are only two companies belonging to telecommunications sector: Dialog and Telecom - both are present in S&P SL 20.

Note 2. As at of 31, Aug, 2015.

Note 3. According to Island, 2012, S&P SL20 initially represents 54% of the total market.