The Impact of the Sri Lankan Civil War on the Stock Market Performances

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ABSTRACT

This study examines the effects of terrorist attacks on the Sri Lankan stock market during the last phase of the civil war. The mean adjusted returns model is employed to test whether the 19 industries in the Colombo Stock Exchange exhibit varied reactions for 9 selected terrorist attacks. Using daily data over the period from July 2006 to May 2009, the event study revealed that terrorist attacks have a statistically different impact across industries.

Keywords: Event Study, Efficient Markets, Terrorist Attacks
JEL Classi ications: G10, G14

1. INTRODUCTION

Terrorism is an important geopolitical phenomenon which has created colossal damages to the financial sector of the economies. Karolyi and Martell (2005) argue that the immediate reaction of investors towards terrorist attacks is predictable due to the increase risk aversion associated with such attacks. The conflict between the Sri Lankan government and the terrorist group - the Liberation Tigers of Tamil Eelam (LTTE), imposed enormous and long lasting human, social and economic cost and had serious repercussions on the growth of the economy.

The Sri Lankan Civil war was an ethnic conflict between the majority Sinhalese and the minority Tamils in the island. Since the beginning of the war in July 23rd 1983, the separatist militant group which represents the Tamil minority in the country, the LTTE fought against the government of Sri Lanka to form an independent land for the minority in the north and east of the island. There are four phases of the war, identified as - Eelam War I (1983-1988), Eelam War II (1990-1994), Eelam War III (1995-2002) and Eelam War IV (2006-2009) (Arunatilake et al., 2001; Sriananthakumar and Narayan, 2015). The focus of this study will be on the last phase of war due its significant impact on the economy. During this stage of war, despite the existence of the cease fire agreement, both parties exchanged heavy attacks especially in the form of air raids. Most of the raids were targeted at military bases of both parties and as well as economic targets.

The efficiency of the Colombo Stock Exchange has been studied by Abeyratne and Power (1995), Abeysekera (2001), Hasan et al. (1999) and Samarakoon (2004) on the weak form efficiency of CSE while Abeyratne et al. (1999) investigated the semi-strong form efficiency. These studies were mainly focused on the overall market performances and all the results concluded that the CSE is inefficient. The ethnic conflict which spun for almost three decades imposed serious repercussions on the economy, and therefore it is important to consider the economic and financial cost of the war. In a conflict environment the stock market tends to experience a downturn due to instability and high risk in the market. Mapa and Jayasinghe (2012) were the first to examine the impact of terrorist attacks on the stock market returns and volatility in Sri Lanka. Their study was based on GARCH model to estimate the parameters. In the current research the impact is analyzed using the event study approach. Therefore this study is novel in two ways, it is the first of its kind to use civil disturbance information (or war/terrorism related news) to analyze stock market movements in the Sri Lankan context using event study method and it is also the first study to examine the industry effect of terrorist attacks. The civil war that lasted for almost three decades in Sri Lanka is a good case in point, since investors are weary of such civil disturbances on the economic and financial climate in Sri Lanka and indirectly exposes investor confidence, with no likelihood for prior knowledge or insider information (thus declining the possibility for strong form efficiency). The main

objective of this study is to analyse the impact of nine selected terrorist attacks mounted by LTTE, targeted at different economic and strategic locations and assassinations of political figures on the performances of the industries in the Colombo Stock Exchange.

2. LITERATURE REVIEW

In the 1970s the theory of efficient market hypothesis (EMH) became highly controversial, and considerable amount of research had been conducted to test whether stock prices are efficient for new information. In accordance with EMH theory, any changes in the market should be reflected in stock prices (Fama, 1970). Information relating to terrorist attacks, in a similar manner expected to be updated in firms' values.

Karolyi and Martell (2005) argue that if specific firms were exposed to terrorist attacks than others, the stock prices of these firms would reflect for an increased likelihood of future attacks. However, Rigobon and Sack (2005) and Wolfers and Zitzewitz (2009) argue that many political events are not "surprises" by the time they happen. The latter, who focus on U.S-led invasion of Iraq, point out that the assessment of its probability is likely to be close to 90% and the expected stock price reaction was already incorporated. Hence, they draw the importance of assessing the stocks that quantify the news content of such events, without which it is impossible to assess the true effect. The foreseeable nature of terrorist attacks can be seen in a country plagued with a civil war.

The impact differs according to the target of the terrorist attack. After the 9/11 terrorist attack, United Airlines and American Airlines' parent company, AMR share prices dropped by 43% and 39% respectively (Karolyi and Martell, 2005). This loss was much greater than the actual loss incurred by these airlines on the first trading day after the attack, and the authors point out that this reflects the investors' perception on the possible ramifications of the aftermath of 9/11 on airline firms. Hence firms highly exposed to terrorist attacks are likely to be more optimal for analysis of abnormal returns than the ones that do not incorporate the "surprises" by the time an attack happens.

Similar conclusion can be drawn from Eldor and Melnick (2004) who analyze the impact of Israel-Palestinian conflict on the Israel Tel Aviv stock exchange (TASE) over 639 attacks that took place between 1990 and 2003. The authors classify the different types of attacks according to the location, type of attack, type of target, number of casualties and the number of attacks per day. They employ a time series method to decompose the innovations in the market into the news from a terror attack and other white noise. The study reveals that suicide attacks and number of casualties had a permanent negative effect on the stock market and hence is more rigid and does not tend to diminish over time. The authors conclude that TASE continued to respond efficiently to terrorist attack news. Despite the country's democratic regime and well developed financial market, terrorist attacks had a permanent negative impact on the stock prices.

In their study, Karolyi and Martell (2005) identified the implication of loss of human capital on firm's performances. The authors find

that larger negative abnormal returns are associated with attacks which resulted in human capital losses such as kidnappings and assassinations than physical economic losses such as bombings and damages on companies. This is further supported by Zussman and Zussman (2006) who studied the assassinations of senior Palestinian military personnel as a counter terrorism policy by the Israel government. Such attempts were considered as positive news on the TASE; and the study reveals that market react strongly for such news.

The impact of terrorist attacks on financial markets may vary due to the location of the attack. Johnston and Nedelescu (2006) by comparing the U.S 9/11 attack and Madrid attack in March, 2004 found out that in the case of 9/11, the impact is more significant on financial markets than the Madrid mainly because the latter had a regional effect and the former affected the entire global financial market.

Chen and Siems (2004) argue that U.S capital market had become more resilient overtime when comparing its reactions for terrorist attacks during 1950s and 9/11 attacks. The authors analyze the impact of fourteen terrorist/military attacks from 1915 to 2001 on the U.S stock market. Past attacks such as Invasion of France (1940) took 795 days to recover to pre-attack level and Pearl Harbor attack (1941) took 232 days to recover whilst the September 11th terrorist attack which was the most horrific attack in the U.S history, the capital market recovered in 40 days. The quick rebound of the U.S stock market shows effective regulatory measures by the authorities to prevent any banking crisis.

The semi strong form efficiency of emerging markets were further proven by the study of Robbani and Anantharaman (2002) which analyze the impact of political events in general on four South-East Asian countries; namely India, Pakistan, Sri Lanka and Indonesia. The authors concluded that political news that have a long term effects are reflected in the stock market while supporting semi-strong form efficiency. Arin et al. (2008) shows evidence that stock market volatility towards terrorist attacks is higher for emerging markets than developed markets.

2.1. Industry Specific Reactions

Bruck and Wickstorm (2004) argue that some sectors of the economy are more vulnerable to attacks than others. Carter and Simkins (2002) and Drakos (2004) investigate the impact on the airline stocks after the 9/11 terrorist attack. The former focus on the investor psychology for 9/11 attack on U.S airline industry, their results suggest that investors are concern about the likelihood of bankruptcy of airline firms and distinguish between the firm's ability to recover from short term obligations, thus the negative abnormal returns varied for different airlines. Drakos (2004) extend this analysis by investigating the airline industries across international markets and employed event study methodology as opposed to multivariate regression model employed by Carter and Simkins (2002) to test the risk profile of individual airline firms. The results are consistent with the studies of Enders and Sandler (1991), Enders et al. (1992) and Chesney et al. (2011) that identify that airline and tourism sectors are sensitive towards terrorist attacks.

Among other industries, Insurance sector is the most affected from terrorist attacks. Cummins and Lewis (2002) and Chesney et al. (2011) argue that insurance sector is more vulnerable towards terrorist attacks than natural catastrophes. Cummins and Lewis (2002) analyze the impact on the insurance companies and conclude that there was a significant negative reaction by insurance companies and this persisted for a relatively long period. This implies that after the immediate panic reaction, investors were left with increase uncertainty linked with property-casualty risks.

Cam (2008) analyze the impact of 9/11 attack across all the U.S industries. The author conducts an event study on the 9/11 attack and compares industry specific abnormal returns with Bali bombing and Madrid bombing. The abnormal returns are calculated using the market model and it is estimated using GARCH model. Results are consistent with Cummins and Lewis (2002) where the airline and leisure facilities sectors experienced severe downturn in their stock prices. Some of the industries which reacted negatively for 9/11 attack, reacted in the same manner for Bali and Madrid attacks, proving that transnational terrorism do have an impact on the U.S stock market.

Brounen and Derwall (2009) examine overall impact of 35 terrorist attacks that took place in different parts of the world; they found that price reactions across industries and countries can differ, and except for 9/11, very few attacks have significant negative impact after the event date. In the multivariate dummy regression it shows that systematic risk have increased significantly after the 9/11 causing structural changes. As consistent with previous studies, airline industry was the most affected while hotel industry index exhibit negative returns with the terrorist attack in Bali. These results are compared with other unanticipated events such as earthquakes and according to the authors terrorist attacks have a more pronounced impact than natural catastrophes since the former create greater uncertainty in the market.

Chesney et al. (2011) carried out an extensive study which covers the impact of terrorism on financial markets including the behavior of stock, bond and commodity markets for 25 terrorist attacks that took place in different countries over an 11 year period. Approximately two thirds of the attacks studied have led to significant negative abnormal returns while in terms of the impact on the industries, the airline and insurance industries were the most affected while banking industry were the least sensitive for such attacks.

The current paper contributes to the existing literature by utilizing event study methodology to measure the impacts of terrorist attacks carried out by the rebel group - LTTE, during the last phase of civil war in Sri Lanka on the performances of stocks listed in Colombo Stock Exchange.

3. DATA AND METHODOLOGY

The study focuses on the last phase of Sri Lankan civil war (Eelam War IV) over the time period 26th July 2006 to 30th May 2009. For this purpose, daily industry indices data are extracted for 19 industries. Out of the 21 industries only 19 were taken into consideration due to lack of data in the IT sector and close end funds sector. List of industries are shown in Table 1. Daily returns of industries are calculated as logarithmic differences of daily closing prices. The main data source for stock prices is Bloomberg, whilst the source for war related news is the daily news (Sri Lankan state run daily newspaper).

3.1. The Selection Criteria for an Event

In analyzing the impact of civil war in the country, the unrest created by the terrorist group - LTTE is taken into account. Most of the attacks that directly and indirectly affected the economy and financial sector took place in the cities surrounded by the commercial capital city Colombo and the south of the country. Hence the criterion for an event includes;

1. In case of attacks; since there were numerous attacks of various nature during the period identified in the study, the attacks that were carried out by the LTTE that were aimed at an economic target, targeted a VIP, location or resulted in large casualties, were taken into account.
2. If there were several attacks that transpired over a short frequency, those attacks were eliminated, regardless of its significance to the study.
3. If the event occurred 2 h before the close of the market, or after the market closure, then the next day was considered as the event date (i.e., t = 0) while if the event occurred during weekend or any public holiday, then the next trading day would be considered as the event date.

After screening for the entire criterion, 9 events are tested for abnormal returns. A list of events including the actual date the event took place, location and casualties are summarized in Table 2.

3.2. Event Study

The event study approach advocated by Brown and Warner (1980) would be employed in the research. Given the exogenous nature of terrorist attacks there is less likelihood that an event would be partially anticipated (Karolyi and Martell, 2005). Hence by employing event study approach this study will effectively capture the risk adverse investors' reaction during terrorist attacks.

Countries which are plagued with civil wars experience more frequent terrorist attacks. The nature of war related news in such countries is likely to be absorbed in a short time span. As such the event period of the study will be 11 days (−5 to +5), as concluded by Brown and Warner (1985) more concise the event window the more powerful the test. Similarly, the estimation period used in this study is 30 days (6 days to 35 days before the event date).

This study attempts to investigate the impact of terrorist attacks on different industry indices by employing a mean adjusted returns model, pioneered by Brown and Warner (1980).

3.3. Mean Adjusted Returns Model

Ismail and Suhardjo (2001) argue that mean adjusted returns model is superior to market model or market adjusted returns model in analysing the movements of sector indices. In market model, OLS is used to estimate the expected return of an industry by regressing the industrial index against the market index. If an event results in

the aggregate stock prices to move together, then there is likely to be higher expected return and actual return. When both expected and abnormal returns increase, the abnormal return is expected to be low thus does not capture true effect of investors reaction. Hence, to achieve the main objective of this study, the mean adjusted returns model is used to examine the impact of terrorist attack on 19 industry indices in the CSE.

Mean adjusted returns are actual returns minus a constant; the constant being the average return for that industry during its estimation period. Abnormal returns for each day of the event is calculated using equation 1:

$$AR_{it} = R_{it} - R_i^* \qquad (1)$$

Table 1: List of industries

Name of the industry	Code
Bank Finance and Insurance	BFI
Beverage Food and Tobacco	BFT
Chemicals and Pharmaceuticals	CNP
Construction and Engineering	CNE
Diversified Holdings	DIV
Footwear and Textile	FNT
Health Care	HLT
Hotels and Travels	HNT
Investment Trusts	INV
Manufacturing	MAN
Motors	MTR
Oil Palms	OIL
Plantations	PLT
Power and Energy	PNE
Land and Property	LNP
Services	SER
Stores Supplies	STS
Telecommunications	TLE
Trading	TRD

Source: Colombo Stock Exchange

AR_{it} is the abnormal sector index return for sector i in day t in the event period, R_{it} is the return on sector i in day t in the event period and R_i^* is the mean return of industry i over the number of days $(-35, -6)$ within the estimation period.

In order to test the statistical significance of each industry this paper employ the model used by Brown and Warner (1980) who applies the cross sectional independence on mean adjusted returns model. The model is applied in empirical studies done by Ismail and Suhardjo (2001) and Cam (2008) who focuses on industry specific reactions for political events and terrorist attacks respectively. Assuming that AR is independent and normally distributed, the t-statistic for each industry's abnormal return for a given day in the event period is calculated by dividing the abnormal return for a given day in the event period by the standard deviation of the daily industrial returns. The abnormal returns are standardized by dividing the standard deviation of each industry, calculated over its estimation period returns.

3.4. Cumulative Abnormal Returns (CAR)
To perform a cross sectional analysis, average abnormal returns (AAR) are calculated in the following way;

$$AAR_t = \frac{\sum_{i=1}^{N} AR_{it}}{N} \qquad (2)$$

AAR_t the sum of the abnormal return of each industry for each day in the event window divided by the number of industries in the sample. Based on the assumption that AARs are independent over time, the standard deviation of AAR can be estimated based on the cross sectional standard deviation estimators for each period. The cross industrial variances is obtained by aggregating all the variances estimated during the estimation period of each

Table 2: List of events

Event No	Date	Event	Location	Number of casualties
1	16th October 2006	A suicide bomb attack by the LTTE on buses carrying Sri Lankan Navy sailors	Digampathana, North Central Province	101 deaths 150 injured
2	26th March 2007	The LTTE launched their first air raid by bombing at the military base by the Bandaranayake International Airport	Colombo North, Western Province	3 deaths 16 injured
3	16th July 2007	Assassination of Eastern Province Chief Secretary, Herath Abeyweera	Trincomalee, Eastern Province	1 death
4	22nd October 2007	Attack on Anuradhapura Airbase	Anuradhapura, North Central Province	14 deaths 22 injured
5	16th January 2008	A roadside bomb set up by LTTE blew up a passenger bus	Buttala, South-East of Colombo, Uva Province	27 deaths 67 injured
6	6th April 2008	A suicide bomb attack at a marathon race held in part of traditional New Year celebration	Weliveriya, Western Province	15 deaths including the Minister of Road and Highways
7	6th June 2008	Roadside bus bombs blew up passenger buses set up by the LTTE in two locations of the island	Morotuwa, Western Province Pollgolla, Central Province	25 deaths 100 injured
8	6th October 2008	A suicide bomb attack targeting a function organized by the opposition, United National Party	Anuradhapura, North Central Province	20 deaths
9	20th February 2009	Suicide air raid by LTTE targeting different locations in Colombo	Colombo, Western Province	2 deaths 58+injured

Source: Daily news, LTTE: Liberation Tigers of Tamil Eelam

industry in the CSE while the cross industrial standard deviation is calculated using equation 3.

$$\sigma_N = \sqrt{\frac{\sum_{i=1}^{N} \sigma_i^2}{N}} \qquad (3)$$

To test whether cross industrial abnormal returns are significant during the event period equation 4 is employed.

$$\text{t-statistic} = \frac{AAR_t}{\sigma_N} \qquad (4)$$

The estimates of AAR are summed across the event period to obtain CAR.

4. EMPIRICAL RESULTS AND FINDINGS

The results show that the impact of each individual terrorist attack varies according to the industry and type of attack. The most sensitive industries towards terrorist attacks in the CSE, identified in this study, are Bank, Finance and Insurance, Hotels and Travel (HNT) and Power and Energy (PNE) with significant negative abnormal returns for most of the events. The least affected industries are Motors, Telecommunications and Chemicals and Pharmaceuticals with significant negative abnormal returns for only one event.

4.1. Event 1: Suicide Bomb Attack on Buses Carrying Sri Lankan Navy Sailors

On the 16th October 2006, the LTTE suicide cadres drove a lorry full of explosives into a convoy of 15 Sri Lankan military buses, killing 103 navy sailors and injuring another 150 people (Times Online 16 October 2006). The media claims this as one of the bloodiest attacks since the Sri Lankan government signed the peace agreement with LTTE in 2002.

According to Table 3, on the day of event 1, except for Bank Finance and Insurance (BFI) and Stores Supplies (STS) all the industries record negative abnormal returns out of which only 7 are significant (Footwear and Textile [FNT], Health Care [HLT], INV, MAN, PLT, PNE, and LND). This significant impact is consistent with the study of Eldor and Melnick (2004) which argue that higher number of casualties as a result of terrorist attacks have an impact on stock price reactions. FNT is the most affected with a negative AR of 5.28% significant at 5% level while the least affected is Diversified Holdings (DIV) with a negative AR of 0.09% and is not statistically different from zero. A highly significant reaction can be observed 5 days following the event with a significant negative CAR of 4.94%, however the negative CAR which persist from the day following the event (0.1) have reduced over the period of 5 days following the event (0.5) proving that it is only a short term panic reactions by the investors.

Overall, the results suggest that Event 1 had a significant impact on the day of the event and it continued to be bearish for the next 2 days.

4.2. Event 2: Bandaranaike International Airport (BIA) Air Raid

LTTE carried out their first ever aerial attack on the 26th March 2007, targeting the military base adjacent to the only international airport in Sri Lanka - The BIA. The rebels attacked the airport and the base in 2001, before the peace agreement and this resulted in loss of half of the national fleet (BBC 26 March 2007). Even though the attack caused only minor damages in terms of casualties and damage to military aircrafts, it reminded the fragile security situation in the island even extending to the non-war turf southern region, leading to a psychological setback in the stock market.

The results show negative AR for 16 industries while 3 industries gained positive AR. Out of the 16 industries BFI, Beverage Food and Tobacco (BFT), Construction and Engineering (CNE), FNT, HNT and PNE industries experienced highly significant negative ARs. The attack on the military base and the only international airport of the country set a major blow to the tourism industry, and even after months following the attack, the country experienced sustained drop in tourist numbers. Suspension of flights to Colombo by Cathay Pacific, coupled with tight travel warnings from Australia and New Zealand considering Sri Lanka as a high risk destination country, worsened the growth of the tourism sector. Following this downturn, most of the hotels especially up-market resorts that cater to high margin travelers were badly affected (The Sunday Leader 1 April 2007). Thus immediately after the attack, HNT industry reacted negatively with AR of 2.22% significant at the 10% level. The slumping tourist revenue during terrorist attacks is consistent with the findings of Fleischer and Buccola (2002). Similar results can be observed in BFT which recorded a negative AR of 2.67% (significant at the 10% level). BFI recorded its worst negative event day AR, for this event, among the nine events studied. PNE is the most affected industry with a negative AR of 5.74% significant at the 5% level while Oil industry is the least affected with a negative AR of 0.01% and is not statistically different from zero.

4.3. Event 3: Assassination of Eastern Province Chief Secretary

Eastern Province Chief Secretary, Mr. Herath Abeyweera was killed by the LTTE rebels on the 16th July 2007. The assassination took place few days after the Sri Lankan government liberated Thoppigala - the eastern base of the Tamil Tigers, after 13 years of control under the rebels. Mr. Abeyweera was the top most bureaucrat of the civil administration in the Eastern province; the government claimed that the assassination was mainly intended to disrupt the administration. The Chief Secretary was assassinated on the 16th evening, after the stock market closed down; hence the event day in this case is 17th July 2008.

15 industries experienced negative AR out of which six industries (BFI, BFT, DIV, HLT, HNT and LND) ARs are significantly different from zero. HLT with negative AR of 2.94% significant at 5% level is the most affected while Chemicals and Pharmaceuticals (CNP) is the least affected with a negative AR 0.24% and is not significantly different from zero. The negative reaction of Healthcare industry is attributed to increase in investments on

Table 3: Event day abnormal returns for all the industries based on mean adjusted returns model

Industry	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9
BFI	0.07	−1.91**	−1.61**	−0.55	−1.33**	−1.22**	0.06	−0.02	−0.52
	(0.08)	(2.39)	(2.80)	(1.30)	(2.07)	(2.31)	(0.15)	(0.06)	(0.20)
BFT	−0.35	−2.67*	−2.14***	−0.97	−0.50	−0.22	−1.83**	−0.44	−0.53
	(0.38)	(1.89)	(3.63)	(1.08)	(0.63)	(0.19)	(3.02)	(0.65)	(0.39)
CNP	−1.50	0.69	−0.24	−2.01	−2.28**	−1.74	0.13	0.38	−0.34
	(1.09)	(0.49)	(0.20)	(1.19)	(2.05)	(1.52)	(0.10)	(0.27)	(0.15)
CNE	−1.27	−3.56*	−0.96	−0.48	−3.71**	0.57	0.62	−0.33	−0.23
	(0.77)	(1.96)	(0.58)	(0.29)	(2.74)	(0.40)	(0.43)	(0.25)	(0.09)
DIV	−0.09	−1.12	−2.06**	−0.01	−1.35**	−1.28**	−0.94	0.64	−0.56
	(0.13)	(1.07)	(2.57)	(0.01)	(2.13)	(2.24)	(1.36)	(0.79)	(0.24)
FNT	−5.28**	−2.78*	2.65	−1.66	−0.95	−1.31	−0.06	−1.36*	−0.51
	(2.95)	(1.77)	(1.01)	(1.09)	(0.85)	(1.28)	(0.08)	(1.91)	(0.16)
HLT	−4.41**	−2.79	−2.94**	−2.42	−1.77	−1.19	0.63	−0.18	−0.29
	(3.21)	(1.12)	(2.92)	(1.49)	(1.20)	(1.32)	(0.64)	(0.19)	(0.17)
HNT	−0.72	−2.22*	−1.70**	−4.02**	−9.17**	−0.65	0.26	−0.98	−0.65
	(0.73)	(2.04)	(2.36)	(2.52)	(2.42)	(0.72)	(0.37)	(1.17)	(0.25)
INV	−3.01*	−1.28	−1.94	−0.56	−1.42	−1.83	−0.46	0.98	−0.32
	(1.86)	(0.60)	(1.54)	(0.24)	(0.76)	(0.72)	(0.26)	(1.29)	(0.11)
MAN	−1.89*	−1.01	−0.93	−1.07**	−2.05**	−0.88	0.50	−0.51	−0.18
	(2.01)	(0.94)	(1.10)	(2.23)	(2.35)	(1.31)	(0.65)	(1.29)	(0.12)
MTR	−1.97	−1.11	−0.91	0.92	−0.68	−1.10	1.63	−0.86*	−0.11
	(0.27)	(1.16)	(1.04)	(0.64)	(0.51)	(1.20)	(0.65)	(1.88)	(0.19)
OIL	−0.20 0.17	−0.01	0.10	−0.61	0.31	−1.63	−0.01	−0.22	−0.35
	(0.00)	(0.04)	(0.69)	(0.34)	(1.13)	(0.01)	(0.11)	(0.19)	
PLT	−3.36***	−0.73	−0.74	1.81*	−6.20*	−1.87	−0.86	1.01	−0.44
	(4.21)	(0.75)	(0.70)	(1.84)	(1.87)	(0.82)	(0.96)	(1.02)	(0.12)
PNE	−4.33*	−5.74**	0.11	−2.51**	−1.84	−8.12***	−0.74	−0.79	−0.21
	(1.88)	(2.90)	(0.10)	(2.07)	(1.62)	(5.38)	(0.47)	(0.51)	(0.07)
LND	−4.92***	0.48	−2.43**	−0.25	−2.86*	0.93	−1.44	0.06	−0.69
	(3.56)	(0.31)	(2.09)	(0.20)	(1.99)	(0.55)	(1.64)	(0.04)	(0.24)
SER	−1.27	−0.31	−1.55	−1.08	−1.33	0.65	0.06	0.07	−0.43**
	(1.09)	(0.08)	(0.95)	(1.03)	(0.47)	(0.35)	(0.04)	(0.08)	(0.16)
STS	6.78**	0.32	0.44	-0.61	-0.36	0.51	-2.42	0.09	-0.07
	(2.33)	(0.41)	(0.18)	(0.30)	(0.41)	(0.94)	(1.61)	(0.12)	(0.09)
TLE	−1.06	−2.15	−1.40	−0.38	−1.26	−2.67**	−0.45	0.93	0.18
	(1.00)	(1.49)	(1.56)	(0.32)	(1.12)	(2.76)	(0.37)	(0.59)	(0.06)
TRD	0.69	−0.55	−0.79	−0.79	−0.91	−0.79	−0.43	1.38	−0.35
	(0.55)	(0.40)	(0.67)	(0.79)	(0.60)	(0.88)	(0.44)	(0.32)	(0.13)

All the abnormal returns are in percentage and t-statistics are in parentheses. *Significant at 10% level, **Significant at 5% level, ***Significant at 1% level

medical equipment and medicines during a conflict environment. Post event CAR of the mean adjusted returns model is −3.20% and is significantly different from zero at 1% level. Overall, the attack did not have a significant impact on the market.

4.4. Event 4: Attack on Anuradhapura Air Force Base
On the 22nd October 2007, LTTE attacked the Sri Lankan Air Force (SLAF) base in Anuradhapura, killing 13 military personnel and 21 LTTE fighters (WSWS 25 October 2007). The air base is the second largest operational base of the SLAF. The government claimed a loss of eight air craft's including a key spy plane that was destroyed in the attack. Attacks of this nature attempt to destroy the military infrastructure and reduce the operational capability of the defense mechanisms of the government; thus creating colossal damage for the economy in terms of financial loss on assets and setbacks in terms of lack of investor confidence.

Since the attack took place early morning of 22nd Monday, the information was already incorporated in the stock prices at the start of the day, and by the end of the day all the industries performed highly negatively for the attack.

The tourism industry is the most affected with a negative abnormal return of 4.02% at 5% significant level. Anuradhapura is one of the main ancient capitals in Sri Lanka and is considered sacred to the majority Buddhist Sinhalese. The city is surrounded with well-preserved ruins of ancient monasteries, statues and sculptures, which act as a famous tourist destination famous for its heritage and cultural values. The attack which took place in this sacred city created a major blow for tour operators since cultural tours account for almost 10% of the total hotel bookings, it led to a sharp drop of 21% tourist visiting the island the day following the event (LBO 23 October 2007). Hence a large negative reaction of Hotel and Travels can be observed on the day of the attack.

Other industries that experienced significant negative abnormal returns are MAN, PLT and PNE. The negative price reaction of MAN and PLT is attributed to reduction in demand for

exports. MAN consists of firms producing food processing, garments, metal products, papers products and leather items and woodcraft products and PLT consist of main tea exporting firms. It is likely that investors perceive this attack which was targeted on the largest operational base as a threat of security for firms' operations. The possibility of currency devaluation after such attacks could also raise investor concerns, since a significant number of the listed manufacturing firms also engage in serving local customers, in addition to the export market, and the firms are at large dependent on imported material for the finished goods, local currency devaluation could hurt firms' profit margins. Thus it can be concluded that all these industries are informational efficient for the attack. However, mean adjusted returns model CAR-5 day following the event records a positive return of 1.68% which is significant at 5% level and it can be argued that the impact of the attack was only a short term reaction.

4.5. Event 5: Buttala Bus Bombing
On the 16th of January 2008, LTTE carders attacked a crowded passenger bus in Buttala, South-East of the capital Colombo; killing 27 and injuring 67 civilians. The attack took place on the day the Sri Lankan government officially withdrew from the 6 year long ceasefire agreement.

On the day of the attack all the industries performed negatively while 7 industries (BFI, CNP, CNE, DIV, HNT, PLT and LND) experienced significant negative ARs. HNT was the most affected with a negative AR of 9.17% and STS is the least affect with a negative AR of 0.36%. Positive reaction towards 5 days following the event can be observed with a significant positive 2.05% return implying quick rebound of the market. This resiliency is likely given the nature of the attack which was not targeted on any economic or strategic locations.

Harrison (2006) argues that the impact of attacks located in public transport systems is minor when compared to attacks that are mounted at military check points and shopping malls. This indicates that the attacks which attempts to disrupt normal lifestyle of civilians tend to have less impact on the investors decision. Even though such attacks create fear among civilians, it does not have a direct influence on stock markets.

4.6. Event 6: Weliweriya Bombing
On the 6th April 2008, LTTE carried out a suicide bomb blast at a marathon race which was held as part of the Sinhala and Tamil New Year celebration in Weliweriya town. The attack resulted in 15 deaths including the Minister of Road and Highways Mr. Jeyaraj Fernandopulle, Sri Lanka's national athletics coach Lakshman de Alwis and former Olympics runner K.A Karunaratne (BBC 6 April 2008). The attack came during a time where the LTTE was targeting politicians in the country who were major critics of the rebels' activities. Minister Fernandopulle was the second minister to have been assassinated during year 2008 while the former minister for nation building Mr. D.M Dassanayake was killed on the 8th January 2008 by a bomb blast carried out by the LTTE. This event heightened the obstacles for economic growth and increased fear among investors both local and foreign. The

attack happened on the 6th April, Sunday hence the event day in this case is 7th April 2008.

Industry specific analysis shows that out of the 19 industries 15 experienced negative ARs while the remaining experienced positive ARs. Out of the 15 industries, 4 industries (BFI, DIV, PNE and Telecomm [TLE]) exhibited a statistically significant abnormal return. The most affected industry is PNE with a significant AR of 8.12%. The significant negative reaction of the Banking sector towards this attack is consistent with Zussman and Zussman (2006) who argue that the assassinations of senior political targets have a significant impact on the stock market.

4.7. Event 7: Morotuwa and Pollgolla Bombing
On the 6th June 2008, LTTE carried out a bomb attack in two different locations in the country targeting civilians in passenger buses. The first attack took place in the morning at Morotuwa, a suburb of Colombo where a claymore bomb triggered against a commuter bus killing 22 people and injuring another 100. On the same day another bomb exploded inside a passenger bus in Pollgolla, Kandy killing 2 people and injuring 20 others. This attack came as a huge threat to the civilian population and it created a climate of fear among the consumers. During this time bombings on public transport modes and public places were becoming increasingly frequent.

According to Table 3 the impact on individual industries is minimal with only 10 industries experiencing negative ARs and 8 others gaining positive ARs. Out of the 10 industries only BFT experienced a significant negative AR of 1.83% at 5% significance level. Post- event CAR of mean adjusted returns model is 0.12% indicating quick rebound of all industries after the attack.

Overall, the attack did not have a significant impact on the stock market. Similar results can be seen is Event 5 Buttala bus bombings. This further proves the argument that a terrorist attack located at public transport which tries to disrupt normalcy of civilians does not have an impact on the stock market performances. Even though it had a psychological impact on civilians it did not create significant impact on stock markets.

4.8. Event 8: Suicide Attack in Anuradhapura
On the 6th October 2008, a suicide bomb hit a function in Anuradhapura organized by the United National Party, the main opposition party of the country. The attack killed 27 people including a former senior military general - Major General Janaka Perera and his wife, and injured 80 others (BBC 6 October 2008). The former general was a prominent figure who led the Sri Lankan military forces during mid 1990s in Jaffna and was highly accused by the Tamil community for the deaths and torture of the Tamils during that period. The suicide attack came as the Sri Lankan army was at the verge of capturing Kilinochchi, the headquarters of LTTE. This was led by continuous shelling in the north and the east and this increased the fear among the civilians in south, as LTTE from a shrinking section of the north carried out attacks across the country in order to disrupt government forces.

Ten industries experienced negative ARs while 9 industries experienced positive AR. Out of the 10 industries only FNT and

MTR experienced negative abnormal returns of 1.36% and 0.86% respectively, both significant at 10% level. Even though impact on each individual industry on the event day is minimal; post event CAR is highly significant with a negative 8.18% at 1% level.

4.9. Event 9: Air Raid in Colombo

On the 20th February 2009, LTTE air wing carried out a suicide air raid targeting different locations in Colombo. The attacks were carried out in kamikaze style which is similar to that of 9/11 attacks where aircrafts were used as flying bombs and rammed in their targets. Since the attack occurred on 20th Friday night, the event day in this case is 23rd February 2009.

Since the actual day of the attack is Friday, it is likely that the news has already transpired to the stock market by the time it opens for trading on 23rd Monday and the news has already faded away and the market has rebounded from the incident. Moreover, the fact that Sri Lankan Army successfully shot down the rebel aircrafts immediately after the attack, ease out the panic civilians in Colombo.

All the industries except TLE industry experienced negative AR on the day of the event. Since the national infrastructure was the main target of the attack, investors might have perceived it as a threat to telecommunication sector infrastructure assets. None of the other industries experienced an AR significantly different from zero. Post event CAR according to mean adjusted returns model exhibit a highly significant CAR of −8.21% at 1% significant level. Overall, the air raid attack did not have a significant impact on the event day.

5. CONCLUSION

The main objective of the present paper is to analyze the efficiency of stock price reactions to terrorist attacks, during the last phase of the Sri Lankan ethnic conflict (Eelam war IV). By employing an event study approach, the study analyzes the abnormality of stock returns on the day of the terrorist attacks. The main objective of this study is to test whether the nineteen industries in the Colombo Stock Exchange experience varied reactions due to the attacks.

Many of the theoretical and empirical studies on impact of terrorism have been conducted on a non-quantitative perspective. Therefore the numbers of studies which attempt to analyze the effects of terrorism in a quantitative perspective are sparse. This study attempts to contribute to the existing literature by analyzing the impact of Sri Lankan civil war on the stock market performances. The civil war between the majority Sinhalese and minority Tamils which spun for almost three decades imposed serious repercussions on the economy, and therefore it is important to consider the economic and financial cost of the war.

According to the analysis conducted based on mean adjusted returns model, terrorist attack have statistically significant different impacts across the industries. This is consistent with the work of Bruck and Wickstorm (2004), who argue that some sectors of the economy are more vulnerable to attacks than others. Most affected industries are BFI, HNT and PNE while least affected industries are

MTR, TLE and CNP. The significant impact on tourism industry which is corresponded with HNT is consistent with Enders and Sandler (1991), Drakos and Kutan (2003) and Chesney et al. (2011). These papers conclude that travel and tourism sectors are particularly more sensitive towards terrorist attacks. Terrorist attacks generally lead to major fatalities and property damages which lead to high sensitivity of the insurance companies negative stock price reactions (Chesney et al., 2011). The negative reaction of the Banking sector over the conflict period is attributed to limited risk assessments by banks in lending loans due to the uncertainty created by terrorist activities, when banks operations are affected by such negative information; stock market returns experience a downturn. The results indicate that PNE sector was highly vulnerable for terrorist attacks. Since PNE is one of the main sectors which provide infrastructure services, attacks that were targeted at economic and strategic locations, intending to disrupt infrastructure of the country, had a significant impact on the sector. The results also prove that industry reactions vary according to the type of attack. For instance, assassinations of senior political targets have a significant impact on the Banking and Finance sector (Zussman and Zussman, 2006). Event 2 - assassination of bureaucrat in the eastern province and event 6 - assassination of minister of road and highways had a statistically significant impact on the banking sector on the day of the attack. In conclusion, the industry specific reaction towards terrorist attacks varies depending on the type of attack and location of attack; hence the results are consistent with empirical studies conducted on this spectrum.

The study provides evidence that the different industries felt the impacts of the attacks in a heterogeneous manner. According to the CAR results it can be implied that market resilience for terrorist attacks depends on the nature of the attack. For instance, the attacks which were targeted at economic and strategic locations experienced higher negative CAR than the bus bombings that were targeted at mass group of civilians. Assassinations of high profile politicians or military personnel have a significant impact on the stock market. However, the magnitude of the stock market reaction depends on the importance of the profile of the target.

One of the limitations in this study is that it does not account for exogenous shocks that affect the stock market behavior, other than war related news. During the time period investigated, factors such as increase in global oil prices and world stock market crashes could have had a spillover effect on the performance of the CSE. Hence, further research controlling for other exogenous factors, should be carried out in order to capture the impact of terrorist activities on its own, on stock prices. Future studies can also attempt to expand by analyzing each category of attack individually, such as attacks on economic locations, assassinations and attacks on mass group of civilians. Even though the present study sheds light on different price reactions towards aforementioned categories, the significant different of each has not been taken into account. Thus, there are prospects for further cross sectional analysis of terrorist attacks of different nature.

Finally, it should be acknowledged that the results and discussions in this study may not be applicable to other emerging nations with such civil conflicts, due to country specific factors. Therefore,

future research that engulfs cross-country analysis of terrorist attacks on stock market performance should be able to aid in controlling for country specific factors, and yielding results that could be generalized to similar conflicts.

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