



Volume and Issues Obtainable at Center for Sustainability Research and Consultancy

**Journal of Accounting and Finance in Emerging Economies**

ISSN: 2519-0318 ISSN (E) 2518-8488

Volume 5: Issue 2 December 2019

Journal homepage: [www.publishing.globalcsrc.org/jafee](http://www.publishing.globalcsrc.org/jafee)**Impact of Terrorism on Stock Market: A Case of South Asian Stock Markets**<sup>1</sup>Rehana Kousar, <sup>2</sup>Zahid Imran, <sup>3</sup>Qaisar Maqbool Khan, <sup>4</sup>Haris Khurram<sup>1</sup>Professor, Chairperson Department of Commerce, Bahauddin Zakariya University, Multan, Pakistan  
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ARTICLE DETAILS	ABSTRACT
<b>History</b> Revised format: November 2019 Available Online: December 2019	The purpose of this study is to examine the impact of terrorism on stock markets of South Asia namely, Karachi Stock Exchange 100 index (Pakistan), Bombay Stock Exchange (India), Colombo Stock Exchange (Sri Lanka) and Chittagong Stock Exchange (Bangladesh). Monthly panel data has been used for the period of January 2000 to December 2016. Terrorism events happened during the period of 2000 to 2016 have been incorporated to examine the impact of terrorism on stock market returns of South Asia. DCC GARCH through R software is used to analyze the impact of terrorism on stock market returns and to analyze the spillover effect of terrorism in one country and on the stock markets of other countries of South Asia. The results indicate that terrorism has significant and negative effect on stock market returns of Pakistan, India and Bangladesh but insignificant in Sri Lanka. Results also shows that stock markets return of Pakistan, India, and Bangladesh are significant and positively correlated with each other except the Stock market of Sri Lanka.
<b>Keywords</b> Terrorism, Stock Market, Spillover, South Asia, DCC GARCH, Panel Study	
<b>JEL Classification:</b> H50,H54, N10, N15,C33	

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**Recommended citation:** Kousar, R., Imran, Z., Khan, Q. M. and Khurram, H., (2019). Impact of Terrorism on Stock Market: A Case of South Asian Stock Markets. *Journal of Accounting and Finance in Emerging Economies*, 5 (2), 215- 242**DOI:** 10.26710/jafee.v5i2.852**1. Introduction**

Terrorism is one of the biggest problems faced by countries across the world. It impacts the nations by devastating their economies, trembling the markets, disturbing the capital allocation, stagnating the economic growth, destruction of infrastructure, declining the foreign investment, targeting political, business and army personnel, cause to many fatalities and injuries, declining export, increasing business risk, increasing the security threat and playing with investors' sentiments. Terrorism is not only a global phenomenon but also a hot issue since the 9/11 incident. Acts of terrorism increases the risk and uncertainty. Terrorism risk can be measured but uncertainty cannot be calculated.

Mostly, terrorism is discussed in relation to sociological, geopolitical, political, historical, and psychological aspects, but upshots of terrorism can be observed in the economic and financial sector too. Though there are fewer studies on terrorism but the impact of it on the economic growth and stock markets of the countries is very big. Unfortunately, in Pakistan the terrorism attacks increased since 2001 this is how Pakistan came into lime light.

The focus of the study is to find the connection and impact of terrorism incidents on KSE 100 index of Pakistan, BSE of India, CSE of Sri Lanka and CSE of Bangladesh stock markets. Financial and economic hub of United States, New York Stock Exchange (NYSE) remained closed till September 17 because of 9/11 attack. Within 7 days of terrorist incident of 9/11, the Dow Jones decreased by fourteen percent (Lenain, Bonturi, & Koen, 2002).

Indonesia stock exchange had negative impact of terrorist attack on Bali Island on 12 October 2002 which resulted in deaths of 202 humans and 240 people got injured. The market slumped down by 25.53% and capital of investors collapsed drastically. The market remained negative for five days.

On the contrary, the worst terrorist attack in the history of U.K. was on July 7, 2005, in which terrorists exploded numerous bombs in London which resulted in death of 52 people and more than 700 civilians got injured. Because of this attack London stock exchange remained uninterrupted but the it went down by 4 percent. The London stock market adjusted to the shocks and continued trading. Terrorism has become geopolitical threat for global financial markets and for their stability Karolyi (2006).

Terrorism is not only affecting the economies of South Asian countries but also badly affecting the investments, financial institutions and international trade. Terrorism activity can affect stock exchanges directly or indirectly (IMF, 2005). The terrorist attack on September 11-2001 in U.S changed the way of thinking about terrorism and diverted the academic researchers' attention towards the topic of terrorism. Terrorism is not only a cause of massive casualties and damages but also a geopolitical risk that affects both financial markets and the global economy.

In the existing literature, the negative relationship between terrorists' single attack and financial markets has been tested, but the relationship between prolonged terrorism and financial markets is still in need to test.

Terrorism risk is a cataclysmic risk for investors and financial institutions. Numerous studies have been conducted to investigate the relationship between terrorism risk and financial markets. This paper is one of the few of existing literature on terrorism like Arin et. al 2008; karolyi and Martell, 2001, Eldor and Melnick, 2004; Chan and Siems, 2004 studied the relationship between terrorism and behavior of stock return.

Catastrophic terrorist attack harm investors, consumers, and businesses. Their confidence gets shattered which ultimately damage the consumption, investment and macro performance. Since, 2001 terrorist activities have been increasing very rapidly in all over the world that is why, terrorism is a deadliest menace for all the countries of the world. As terrorism has increased by 80 percent during the year 2014 as compared to 2013 (GTD, 2015). Number of deaths have also been increased nine-fold in 2014 as compared to 2000. Number of deaths in 2000 were 3129 while number of deaths in 2014 were 32686 (GTD, 2015). The world has to pay very high cost of terrorism.

According to Global Terrorism Data Base (2015), the total cost of terrorism has touched the level of 52.9 billion US Dollars in 2014 since 2000. This cost has total economic impact of US \$ 105.8 billion. According to IEP assessment the GNS (global national security) expenses are around 117 billion US Dollars (GTD, 2015). Pakistan has paid very high cost because of war on terror.

The number of terrorism incidents that had been incurred since 2000 in Pakistan are 10916 and this caused to total deaths of 20953 and total injuries of 31961, in India are 6878 caused to total deaths of 9636 and total injuries of 16558, in Sri Lanka are 824 caused to total deaths of 3145 and total injuries of 5393 and in Bangladesh are 944 caused to total deaths of 445 and total injuries of 2576 (GTD, 2015).

The increasing number of terrorism incidents, numbers of fatalities and injuries in South Asia is a big question mark. The researchers tend to focus on the root causes of increasing terrorism in South Asia and its impact on the Stock Markets of South Asia as there has been very few studies conducted on this issue.

The existing literature shows that only a few studies have been done to examine the impact of terrorism on stock markets, but this study is different from those. The existing literature shows that the impact of terrorism on individual stock markets of South Asia has been examined but impact of terrorism on all stock markets of South Asia collectively has not been measured before. Therefore, this paper measured the impact of terrorism on four stock markets of South Asia collectively. In this way, this paper is different from the other.

In the existing literature, studies show that impact of terrorism attacks on stock markets, on stock return, on stock prices, on financial markets, and on spillover effect have been examined separately and these studies also show that only major terrorism attacks have been taken to examine the impact of terrorism attacks on stock markets, on stock return, on stock prices, on financial markets, and on spillover effect. (Mnasri and Nechi, 2016; Estrada and Koutronas (2016) ;Hobbs et al. (2016) ; Apergis and Apergis (2016); Kolaric and Schiereck (forthcoming) ; Essaddam and Mnasri (2015; Essaddam and Karagianis (2014); Alam (2013); Aslam and Kang (2013); Ramiah and Graham (2013); Chesney, Reshtar, and Karaman (2011); Kollias, Papadamou, and Stagiannis (2011); M. Chesney et al (2011) ; Peleg, Regens, Gunter, and Jaffel (2011);Panagiotis and Liargovas (2010); Konstantenos Drakos (2010); Brounrn and Derwall (2010); Cam (2008); G.Andrew, karolyi and Rodolfo Martell, 2006; Karolyi, 2006 ; Berrebi and Klor (2005); Johnson and Nedelescu (2005); Cater and Simkin (2004); Drakas (2004), Eldor and Melnick (2004); Eldor and Melnick (2004)).

This paper incorporates the impact of all terrorism incidents of small and large scale during the period 2000-2016 that has not been tested together in the existing literature. This paper also examines the impact of terrorism on stock markets of South Asian countries and their spillover affect altogether. This paper is also different in respect of time frame over a period of seventeen years (2000-2016). This paper is also different in respect of methodology. In the existing literature, mostly, daily data have been used to measure the impact of terrorism on stock markets but in this data monthly data is used to measure the impact of terrorism attacks on stock markets of South Asia.

Purpose of the research is that:

To examine the relationship between terrorist attacks and stock market returns.

To examine the spillover effect of terrorist attack in Pakistan on the stock Market of India, Sri Lanka and Bangladesh.

To examine the spillover effect of terrorist attack in India on the stock Market of Pakistan, Sri Lanka and Bangladesh.

To examine the spillover effect of terrorist attack in Sri Lanka on the stock Market of Pakistan, India and Bangladesh.

To examine the spillover effect of terrorist attack in Bangladesh on the stock Market of Pakistan, India and Sri Lanka.

Significance of the study is that:

This study is important because it fulfills the gap in literature. This study also provides directions to the researchers for future researches. Because, South Asia is an emerging market and foreign direct investment has been increasing in this region despite the fact that this part of the world face tremendous issues including terrorism. Stock markets of Pakistan, India, Sri Lanka and Bangladesh have increased integration.

These South Asian countries have close economic similarities and financial ties. This study has importance for the investors, banks and financial institutions because terrorism increases business risk and uncertainty that weaken the confidence of the investors and creates threat of loss of the investments for the banks and financial institutions. It also has direct and indirect impact on the financial institutions and on the stock markets. The occurrence of terrorism events in South Asia is relatively high that can increase the fear of investors and disturbs long run investment decisions. The results of this study show that terrorism attacks have negative impact on stock markets of South Asia and terrorism attacks in one country and have spillover effect on stock market returns of the other countries. So, if a terrorist attack take place in a country, investors do not invest in the host country, instead, they invest in the other countries of the region for yielding the effect of spillover.

This study is also helpful for the security agencies that have been striving for anti-terrorism activities. As per the report of Global Terrorism Database 2015, global national security expenses have reached up to 117 US billion Dollar. Therefore, security agencies working in South Asian countries can manage their security expenses in the

better way and can use their funds in procuring of the advance and latest technological instruments to curb the terrorism.

This study is also helpful for the governments because terrorism not only disturb the stock markets and financial institutions of the countries, but also it devastates the economies and disturb the budget allocation of the countries. Therefore, to mitigate the effects of terrorism and to curb it, governments should allocate sufficient funds for the security agencies and allocate all of its funds deliberately and take measures for peace and stability in the country.

This study is also helpful for the policy-makers to know that how terrorism attacks affects the stock markets of South Asia and how spillover effects take place in these countries in order to formulate the suitable policies. As terrorism risk is an important factor in making investment decisions so policy makers should design such policies that mitigate the effects of terrorism attacks on stock markets and stabilize the financial markets. An absence of suitable policies may lead to a more social and economic tensions in the South Asian region that is already in unrest in many aspects.

## **2. Literature Review**

In the existing literature, the behavior of stock markets have been examined with respect to social, demographical, economic, wars, armed conflicts, elections, energy crises and environmental and non-environmental events. The impact of these events may vary from one event to another and from one country to another country (e.g. Choudhry, 1995; Frey and Kucher, 2000, 2001; Amihud and Wohl, 2004; Schneider and Troeger, 2006; Athanassiou et al., 2006; Bialkowski et al., 2008; Kollias et al., 2010; Guidolin and La Ferrara, 2010; Scholtens and Boersen, 2011; Wang and Mayes, 2012; Imbierowicz and Mark Wahrenburg, 2013; Fiordelisi et al., 2014; Smales, 2014; Carpentier and Suret, 2015; Haitsma et al., 2016; Kenjegaliev et al., 2016; Günster and van Dijk, 2016).

The increasing occurrence of terrorism events all over the world has increasing the demand for examining the economic upshots of terrorism. For example, Hobbes et al (2016) measured the impact of 28 terrorist and military incidents between a time span of 1963-2012 and concluded that stock perform worse on the days of terrorism events than on the days of military events. Ayman Mnasri, Salem Nechi (2016) has examined the impact of terrorist attacks on stock market volatility in emerging markets of MENA region (Middle East and North African countries) and concluded that impact of terrorism attacks on financial markets' volatility lasts for 20 days.

Berrebi and Klor (2005), conducted the study to examine the effect of terrorism on stock price of Israeli corporations and used event study methodology They concluded that companies' having business in stock of defense, security or antiterrorism security measure have a positive outcome and those which do not have a deal in such activities have a negative trend in a nutshell. The results show that terrorism incidents negatively affect the stock and equity markets. In addition, Cater and Simkin (2004), conducted a study on impact of terrorism attack of 9/11 on Airline stocks by using a multivariate regression model. They concluded that 9/11 attack has different effect on different airlines firms.

Moreover, Drakas (2004) also studied the impact of catastrophic 9/11 on the several airlines stock listed in different stock markets by using a market model. His result reveals that calculating with market Beta ( $\beta$ ), the value of systematic risk is greater than the value of systematic risk calculated on average. He also concluded that after the event market risk of airlines stock in different stock markets exposed an increasing trend.

Eldor and Melnick (2004) studied the impact of terrorism attacks on stock and exchange rates prices in Palestine. They used the time series analysis for the period of 1990 to 2003. Their results show that terrorism attacks have impact on stock and exchange rate prices. They also concluded that markets are affected by terrorism attacks on other transports.

Furthermore, Panagiotis and Liargovas (2010) studied the relationship between terrorism and Greek Banks' stock. They used event study methodology. They analyze the impact of three terrorist attacks, 9/11, 2001 of USA, 11 March, 2004 of Madrid and July 7, 2005 of London. The results show that these attacks have abnormal negative impact on other financial markets of the world but have no impact on Greeks Banks' stock prices. The huge impact of 9/11 attack on the stock markets than other attacks is owing to dominance of US Economy.

Stock prices are highly sensitive to new information. The buying and selling of stock is reflected due to change in its price in result of the new information. For example, in result of the terrorist attack on September 11, in New York City on the World Trade Centre, the MSCI world index slumps down by 1.98%. Similarly, on March 11, 2004, MSCI world index fall by 1.72% in response to the Madrid attacks on the same day.

Researchers like Nikkinen, Mohammad, Sahlstrom, and Aijo, 2008; Gulley and Sultan, 2008; Chesney and Reshetar, 2007; Amelie and Darne, (2006); Eldor and Melnick, (2004); Carter and Simkin, (2004); Drakos, (2004) and Chen and Siems, (2004) also documented hostile impact on the stock market because of cataclysmic terrorism incidents.

Researchers like Choudhry, 2001; Board and Sutcliffe, 1988; Jaffe and Westerfield, 1985; Kato and Shallheim 1985; Gibbons and Hess, 1981 opined that return yielding process is not same in the world. It encompasses months and days to be considered in a return generation process. These are also known as months and days anomalies in a calendar year. Konstantenos Drakos (2010) concluded that stock returns are negatively affected by the terrorism activity on the day of attack and on the other hand, terrorism activity has positive impact on psychosocial factors as it increases the level of psychosocial factor.

G.Andrew, karolyi and Rodolfo Martell, 2006 found that stock markets are negatively affected by -0.83% by terrorism on the day of attack which results a total decline of US \$ 401 million in firm capitalizations. They also found that there is no stock spillover of firms. Results also shows that different countries are affected differently by terrorism attacks because of their unique attributes. Share prices are utmost negatively affected by the terrorism incidents in the wealthier and democratic countries. They also concluded that stock prices are also affected negatively by the kidnapping of corporate executives.

Slovin and Sushka (1993) found that stock price reaction is in the same line with the decreased block holders' equity response. Salas (2005) concluded that the sudden announcement of deaths of corporate executives have positive impact on stock prices. Alam (2013) found that there is insignificant association between terrorism incidents and the stock return in the short run while terrorism incidents have negative effect on the stock return in the long run. Alam (2013) used the terrorism impact factor developed on the 3 terrorist activities instead of event study for analyzing relationship between stock market returns and the terrorism.

Aslam and Kang (2013) conducted a research to investigate the relationship between terrorism attacks and KSE100 index. They used the daily index of KSE 100 index for the period of 2000 to 2012 and found that KSE 100 index is temporary affected on the day of attack and one day prior the attack. They also found that impact of terrorist attacks changed across locations, types and severity of attacks. They also found that the degree of casualty effected of Indonesia is -0.0037, of Israel is -0.0027 and of Turkey is -0.0018. According to them, by using the terrorism GARCH model the mean coefficient for all six countries turns significant and negative Stock return is affected by Terror index volatility.

Ramiah and Graham (2013) investigated the impact of terrorism attacks on equity market of Indonesia and found that equity portfolios were badly affected by the 9/11 attack and Bali bombings. They also found that the Indonesian capital market is negatively affected by domestic terrorist incidents whilst the London, Madrid and Mumbai attacks have no significant impact.

Graham and Ramiah (2012) conducted a research to study the relationship between Japanese stock markets and terrorism incidents. They used the event study methodology. Their results show there is a rise in the systematic risk of some Japanese industries. They also found that returns of the Japanese industries are utmost negatively affected on the first day of trading following attack of 9/11

Arin et al (2008) conducted a research to analyze the impact of terrorist incidents on stock markets of Israel, Indonesia, Spain, UK and Thailand and found that both, stock markets and stock markets volatility are affected by the terrorist events. Eldor and Melnick (2004) analyzed the association between stock and foreign exchange markets of Israel and terrorism events. They include 639 terrorism incidents for the period of 1990 to 2003. Results shows that there is a negative association between stock and foreign exchange markets of Israel and terrorism incidents. Their results also show that Israeli markets are effective to have impact of news about terrorism events.

Chesney, Reshtar, and Karaman (2011) examined the relationship between 77 terrorist events and behavior of markets of 25 countries. They used event study methodology for analysis by taking daily price indices during 04 January, 1994 to 16 September, 2005. Their results show that markets of the 25 countries are negatively affected by terrorist attacks.

Moreover, Kollias, Papadamou, and Stagiannis (2011) analyzed the impact of terrorist attack of London and Madrid on the stock markets of Spain and London and found that these markets are negatively affected on the day of attack and this negative impact was short lived. Results also shows that the recovery period in days of the stock markets to recover is different. Their results also revealed that the negative impact was short lived.

Drakos (2010) concluded that return is negatively affected in 22 countries on the day of terrorist attack. He also concluded that terrorist incidents accelerate the level of psychosocial impact. Brounn and Derwall (2010) conducted the study to examine the relationship between major terrorist attacks and major economies by using the event study methodology and found that stock prices are insignificantly affected by major attacks. They also compared the stock price reaction with the other natural disasters like earthquakes and found that stock price declines more from terrorism attacks as compared to decline from natural disasters. In both cases of terrorist attacks and natural disasters, stock markets recover within first week of the aftermath. Their results also indicate that terrorist attacks have strong shocks in the financial industry but financial industry recovered rapidly from these shocks except from the shock of 9/11 which have long term impact.

Ramiah, Cam, Calabro, Maher, and Ghafouri (2010) examined the relationship between terrorism attacks and Australian stock exchange and found that there is significant impact of short term on abnormal returns because of the terrorism attack of 9/11 and there is a slightly lighter impact of Madrid, and London bombing on stock returns.

Cam (2008) investigated the impact of three attacks (attack of 9/11, attack of Bali, attack of Madrid) on equity index of 135 industries of United States. He used the event study methodology and concluded that terrorism affect differently to hotel, airline, leisure, water, defense and telecommunication industries. Hotel, leisure and airline industries are negatively affected because of terrorism attacks and have negative abnormal returns. Whilst water, defense and telecommunication industries are positively affected because of terrorist attacks and have positive abnormal returns. These results are in the same line with Bruck and Wickstrom (2004). Results also revealed that attack of Bali and Attack of Madrid had minor effect on the equity index of industries in United States.

According to the analysis by Karolyi, 2006 that there is not much knowledge about the impact of terrorism on stock markets and about economics and financial outcomes of terrorism. The studies examined the impact of one or more major terrorism attacks on the stock markets in one jurisdiction or cluster of countries. For example, Carter and Simkins 2004, conducted a research on the impact of 9/11 on the American Airline stock market and found that major and minor airlines have negative abnormal returns.

Chaudhry, 2005 also studied the return and time varying beta effect of 9/11 on 20 American firms and found that there is a varying effect according to the firms. Some researchers emphasize on the temporary effect of 9/11 on the world capital markets (Richman et al., 2005; Hon et al., 2004; Chen and Siems, 2004). Researchers like (Chen and Siems, 2004) concluded that there is a significant effect of 9/11 on world's stock markets. Hon et al., (2004) also conducted a research to examine the impact of 9/11 attack of US on the global stock markets and concluded that there is an increased correlation across the global stock markets and aftermath of 9/11.

M. Chesney et. al (2011) conducted a research to analyze the relationship between terrorism incidents and financial market and found that stock markets have been negatively affected by the 2/3 terrorism incidents. The terrorist attack effects more on Swiss stock market as compared to effects on American stock market.

Terrorism risk is a challenging risk for countries. It is important to minimize this risk to have stabilized economies. Like natural hazards such as storms, hurricanes, floods and earthquakes, terrorism can affect the entire economy. Terrorist incidents, causalities and injuries are the raucous measure of the dormant level of terrorist risk. In most of empirical studies on terrorism, numeral figures of terrorist events and numeral figures of fatalities have been used by the researches as a signal of terrorist activity.

Kollias et al., (2011) suggests that even though the stock markets slump down following terrorist attacks but these negative effects are short lived. Graham and Rumiah (2012) conducted a study on the impact of 5 terrorism incidents on all sectors' industries of Japan and find that most industries are negatively affected on the 1st day of trading and 50% industries are affected after five days of the event.

Drakos (2010) find that terrorism has negative effect on daily stock market returns of 22 countries. He also find that terrorist incidents lower the stock market returns on the day of terrorist attack and increased the level of psycho-social reactions. Drakos (2010 b) find that terrorism shocks changed across the nationals with different pattern. To know about the upshots of terrorism we have to know about the terrorism.

There is not a single definition of terrorism. Terrorism has been defined differently by the different researchers'. Sandler and Enders (2002) defined terrorism as a premeditated use, "threat of violence to obtain political objectives through fear directed at public or civilians." Similarly, Enders and Sandler, 2002:145 also define the terrorism as "The planned use or threat of extra normal violence by sub national groups to obtain a political, religious, or ideological objective through threat of a large audience. Usually not directly involved with the decision making". The U.S. Code of Federal Regulations defines terrorism as "The unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (28 C.F.R. Section 0.85).

The number of terrorism incidents in Pakistan and their consequences are given below.

**Table 1.** Terrorism Incidents in Pakistan

Year	No of Terrorist Incidents	Total Killed	Total Injured	No of Property Damaging Incidents
2,000	49	135	448	34
2,001	53	110	265	28
2,002	46	114	341	28
2,003	29	123	182	19
2,004	67	311	674	29
2,005	78	158	312	52
2,006	163	324	672	96
2,007	260	1,533	2,371	112
2,008	564	1,292	1,883	377
2,009	667	1,569	3,543	498
2,010	700	1,778	2,979	465
2,011	993	1,790	2,645	557
2,012	1,652	3,531	4,402	815
2,013	2,213	3,262	5,813	950
2,014	2,147	2,934	3,536	987
2,015	1,235	1,989	1,895	480
2,016	861	1,122	1,739	860

Terrorism incidents breakout in India in 2006. Since then number of terrorism incidents have been increasing day by day. India is a state in which people of Multi religions have been living. The threat of terrorism that is being faced by India is religious terrorism. The yearly occurrence of terrorism events in India along with their consequences are given below.

**Table 2:** Terrorism incidents in India

Year	No of Terrorist Incidents	Total Killed	Total Injured	No of Property Damaging Incidents
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2,000	175	686	747	77
2,001	233	708	1,152	73
2,002	180	605	1,170	77
2,003	196	491	1,183	82
2,004	108	347	949	40
2,005	145	490	1,216	76
2,006	165	727	2,121	68
2,007	149	639	1,187	46
2,008	515	861	1,587	201
2,009	673	880	865	373
2,010	657	842	684	337
2,011	635	563	792	251
2,012	611	279	654	188
2,013	694	500	781	207
2,014	860	550	802	207
2,015	882	468	668	236
2,016	1,019	543	788	1,147

In Sri Lanka the first terrorism incidents took place in 1987 when Captain Miller drove a truck loaded with explosives into a Sri Lankan army camp in which 40 soldiers lost their lives. This attack was done by the LTTE (Liberation Tigers of Tamil Eelam). Terrorist attacks breakout in Sri Lanka from 2009. Since then the number of terrorism incidents have been increasing in Sri Lanka. Sri Lanka is a country which is in threat of a state terror by Tamils. Terrorism incidents in Sri Lanka are also given below.

**Table 3 .Terrorism incidents in Sri Lanka**

Year	No of Terrorist Incidents	Total Killed	Total Injured	No of Property Damaging Incidents
2,000	68	566	953	31
2,001	36	241	500	20
2,002	3	3	-	1
2,003	9	26	7	2
2,004	33	31	46	5
2,005	133	134	327	22
2,006	213	1,040	1,261	61
2,007	131	504	561	40
2,008	101	369	1,062	49
2,009	38	220	549	18
2,010	7	2	5	6
2,011	-	-	-	-
2,012	14	-	29	8
2,013	16	3	65	10
2,014	11	3	14	3
2,015	11	3	14	3
2,016	0	0	0	0

The first terrorist attack which took place in Bangladesh at Chittagong on 06-01-1977 by an unknown group in which one person was injured. In this attack government of Bangladesh was targeted because it was a diplomatic



type attack. Terrorism incidents breakout in Bangladesh in 2013. Since then terrorism has been escalating in the Bangladesh as well. The yearly occurrence of terrorism incidents in Bangladesh are as below.

**Table 4.** Terrorism incidents in Bangladesh

Year	No of Terrorist Incidents	Total Killed	Total Injured	No of Property Damaging Incidents
2,000	22	10	35	18
2,001	15	63	260	6
2,002	5	21	440	5
2,003	4	3	13	1
2,004	11	33	234	5
2,005	22	50	404	13
2,006	23	30	57	12
2,007	9	1	10	2
2,008	19	15	50	9
2,009	27	30	48	16
2,010	22	21	29	16
2,011	13	15	6	4
2,012	18	8	32	2
2,013	139	16	120	56
2,014	130	40	115	74
2,015	465	89	723	169
2,016	88	94	147	13

## 2.1 Economic Cost of Terrorism

Economic survey of Pakistan (2015-16) reveals that total cost of terrorism including both direct and indirect incurred by Pakistan during the period 2001 to 2016 is amounting to US \$ 118.32 billion that is equivalent to Rs. 9869.16 billion. Economic survey of Pakistan (2015-16) also reveals that the economy of Pakistan has suffered total loss of amounting to US \$ 9.12 billion during 2014-15 and amounting to US \$ 5.6 billion during the year 2015-16 due to terrorist attacks. During last decade, Pakistan has to pay a total price of approximately 103 billion US dollars.

The cost of war on terrorism suffered by Pakistan comprises of loss of 35000 masses, 3500 security personnel, destruction of infrastructure, displacement of three million people, decline in investment, decline in production, and unemployment (Economic Survey of Pakistan 2010-11). In short, terrorism has been badly affecting the economy of Pakistan.

Following the literature review, it can be inferred that investors responded differently to the terrorist attacks in accordance with the level of expected risk. If there is an increase in the expected risk than investors will response negatively and the vice versa. Market players also reacts differently in accordance with the perceived level of terrorist impact on expected return.

According to Global terrorism database (GTD, 2015), unemployment, belief in democracy, sureness in press, drug crime, social disenfranchisement and attitude towards immigration are correlated with terrorism in OECD countries. But on the other hand, socio-economic factors that are correlated with terrorism in non-OECD countries are political, religious, ideological, history of armed conflicts, corruption and fragile business environment are the key root causes of terrorism.

### 3. Methodology

#### 3.1 Data

Monthly stock data of KSE 100, BSE, CSE and CSE is used over the period January 2000 to December 2016. The monthly stock return has been calculated with the following formula (Log of value for current month minus log of value for previous month) i.e.  $(LN(\text{value of February}) - LN(\text{value of January}))$ . Terrorism data in respect of Pakistan, India, Sri Lanka and Bangladesh has been obtained from the Global Terrorism Data base (GTD, 2015) for the period of January 2000 to December 2016 for construction of terrorism index similar to (GTD, 2015). Data covers all terrorism events small and large that occurred in the sampled period of January, 2000 to December, 2016 and recorded 21,530 incidents in total in respect of Pakistan, India, Sri Lanka and Bangladesh.

Using GTD terrorism index scoring method firstly daily terrorism index was developed and then was changed into monthly terrorism index. To estimate the monthly score of every country following four factors have been taken into account:

1. Aggregate number of terrorism events taking place in a particular month.
2. Aggregate number of fatalities triggered by terrorism in a particular month.
3. Aggregate number of injuries triggered by terrorism in a particular month.
4. Aggregate property damages triggered by terrorism events in a particular month.

For construction of the terrorism daily index each factor has been given specific weight as follows:

- |                                             |     |
|---------------------------------------------|-----|
| 1. Aggregate number on terrorism incidents. | 1   |
| 2. Aggregate number of fatalities.          | 3   |
| 3. Aggregate number of injuries             | 0.5 |

The property damages weights have been accorded as follows according to the level of damages:

- |                                                        |   |
|--------------------------------------------------------|---|
| 1. Unknown                                             | 0 |
| 2. Minor (likely < \$1 million)                        | 1 |
| 3. Major (likely between \$ 1 million and \$1 billion) | 2 |
| 4. Catastrophic (likely > \$1 billion)                 | 3 |

According to above weights the daily terrorism index is defined as “Daily terrorism index is a natural logarithm of (e+ number of human casualties + number of people injured + number of terrorist attacks occurred each day)” (Eckstein and Tsiddon (2004).

For the rationale, sensitivity and validity of weights used for construction of terrorism index, it is sufficient that these weights have been opted as they have been used in the Global Terrorism Index 2015. The Global Terrorism Index Report is published every year by the Institute for the Economics and Peace (IEP) that is an independent, non-partisan and non-profit organization striving for peace, progress and well-being of human. ([www.economicsandpeace.org](http://www.economicsandpeace.org)) (GDT, 2015)

Moreover, Structural Break Test indicate that the intensity and severity of terrorism increased in Pakistan after 2007, in India after 2006, in Sri Lanka after 2009 and in Bangladesh after 2013.

#### 3.2 The DCC GARCH Model

The GARCH model was introduced by Bollerslev (1986). In 1982 Engle stated that GARCH is a generalized form of ARCH. The ARCH model elucidates variances. To catch most of the variations in the variances, greater number of lags are used to catch the utmost variations in variances. In the econometric model, the GARCH compacts in worthy way with non-negative limitations that needs some small numbers of lags to provide a better fit. Where lags of the variance data series are termed as “autoregressive” and lags in predicted data are termed as “moving average.

The GARCH model permit the restricted variance to be demonstrated by earlier value of itself that is why it is differentiated from ARCH model. The GARCH model comprises a section of ARCH that enlighten a component where today’s variance can be uttered by earlier variances.

Financial modeling professionals preferred GARCH model for predicting prices and rates of monetary tools than the other models of prediction because GARCH model provide a real-world context. OLS estimator can be at

contemporary finest straight unprejudiced in the range of restricting heteroskedasticity, those non-linear GARCH estimator might offer cosmic efficacy over OLS. OLS mainly analyze the homoscedastic models which have supposition of persistent volatility and intentions to lessen deviance among data points and regression line to fit those points.

OLS homoscedastic models are not fit for asset returns because their volatility varied during the specific period and based on the previous variance. Whereas, to model for current variance, GARCH model based on previous squared observations and previous variance. In finance, GARCH models are extensively used for modeling of asset return and inflation because of their effectiveness. For ameliorating the exactitude of continuing prediction, GARCH incorporate the errors of earlier forecasting to minimize the error of current forecasting. That is why, GARCH model is better than the other models. It is pertinent to mentioned that if an autoregressive moving average (ARMA) model is supposed for the error variance, the model is GARCH model.

Marc Chesney, Ganna Reshetar and Mustafa Karaman (2011) used GARCH (generalized auto regressive conditionally heteroscedastic) Model with EVT (Extreme value theory) theory to examine the insights of possible portfolio diversification owing to the terrorism risk. Most of the studies employed GARCH (1, 1). A GARCH (1, 1) is sufficient to understand in maximum cases. Volatility clustering and thick tailed returns of financial time's series can be successfully captured by the GARCH Model. The GARCH model is said to be stationary when sum of alpha and beta are less than one ( $\alpha + \beta < 1$ ). If  $\alpha + \beta = 1$ , the model is still stationary because the variance is infinite. The GARCH model process generally implies three steps:

1. To estimate a best-fitting autoregressive model.
2. To compute autocorrelations of the error term.
3. To test for significance

The GARCH model Financial Assets and Investing contains an ARCH segment and indicates an element where today's variance can be expressed by previous variances. We use the following equations for analysis of data.

$$r_t^i = \alpha_0 + \sum_{i=1}^4 \alpha_i \text{MoY}_{it} + \alpha_5 r_{t-1}^i + \sum_{j=1}^n \beta_j r_t^j + \partial_1 \text{TA}_t^i + \sum_{i=2}^n \partial_i \text{TA}_t^i + \epsilon_t \quad (1)$$

$$h_t^i = \omega + \gamma_1 \epsilon_{t-1}^2 + \gamma_2 h_{t-1} + \gamma_3 l_t \epsilon_{t-1}^2 + \gamma_4 \text{TA}_t^i + \sum_{i=5}^n \gamma_i \text{TA}_t^i + \sum_{j=1}^n \theta_j \epsilon_{t-1}^2 \quad (2)$$

Above given GARCH model consists of equation (1) which is a return equation and equation (2) represent variance equation. In return equation  $r_t^i$  is monthly return of 'i' country in time 't', MoY are dummies for capturing 'month-of-the-year' effect,  $r_t^j$  capture return spillover of 'j' country in time 't', while  $\text{TA}_t^i$  is terrorist attack of 'i' country in time 't' and  $\text{TA}_t^j$  is terrorist attack in 'j' country in time 't' and  $\epsilon_t$  is random error with mean '0' and variance  $h_t$ .

In equation (2)  $h_t^i$  is variance of 'i' country in time 't' which is conditional of its previous month squared error (ARCH),  $\epsilon_{t-1}^2$ , its own lag  $h_{t-1}$ , asymmetric term (TGARCH term)  $l_t \epsilon_{t-1}^2$ , Terrorist Attacks (TA) in 'i' country in time 't', Terrorist Attacks (TA) of 'j' country in time 't' and variance spillovers of 'j' country in time 't'.

As we are taking Bangladesh, India, Pakistan, and Sri Lanka we will run above given model for every country separately hence one country will become 'i' while others will be treated as 'j' countries. We winsorize this data at 5% in order to remove outlier used log natural of terrorist attack data.

#### 4. Analysis & Results

**Table 5:** Descriptive Statistics

	mean	Sd	median	min	max	Range	skew	kurtosis
Pakr	0.0175	0.0607	0.0216	-0.1065	0.1206	0.2271	-0.3399	-0.5278
PakInt	5.4908	1.4194	6.0533	2.8678	7.2683	4.4005	-0.4969	-1.1855
Indr	0.0099	0.0629	0.0158	-0.1222	0.1093	0.2315	-0.3966	-0.6019
IndInt	5.3522	0.5351	5.3799	4.1389	6.3015	2.1626	-0.3250	-0.1201

Srir	0.0117	0.0577	0.0077	-0.0913	0.1237	0.2151	0.1812	-0.5961
Srilnt	2.4822	2.4865	2.1401	0.0000	6.4482	6.4482	0.2994	-1.5605
Bangr	0.0115	0.0629	0.0206	-0.1179	0.1133	0.2312	-0.3236	-0.6940
Banglnt	1.6584	1.5458	1.5041	0.0000	4.5648	4.5648	0.3444	-1.2226

Results of descriptive statistics shows that Asian markets are highly volatile and standard deviation is higher than mean in all the countries Pakistan, India, Bangladesh and Sri Lanka.

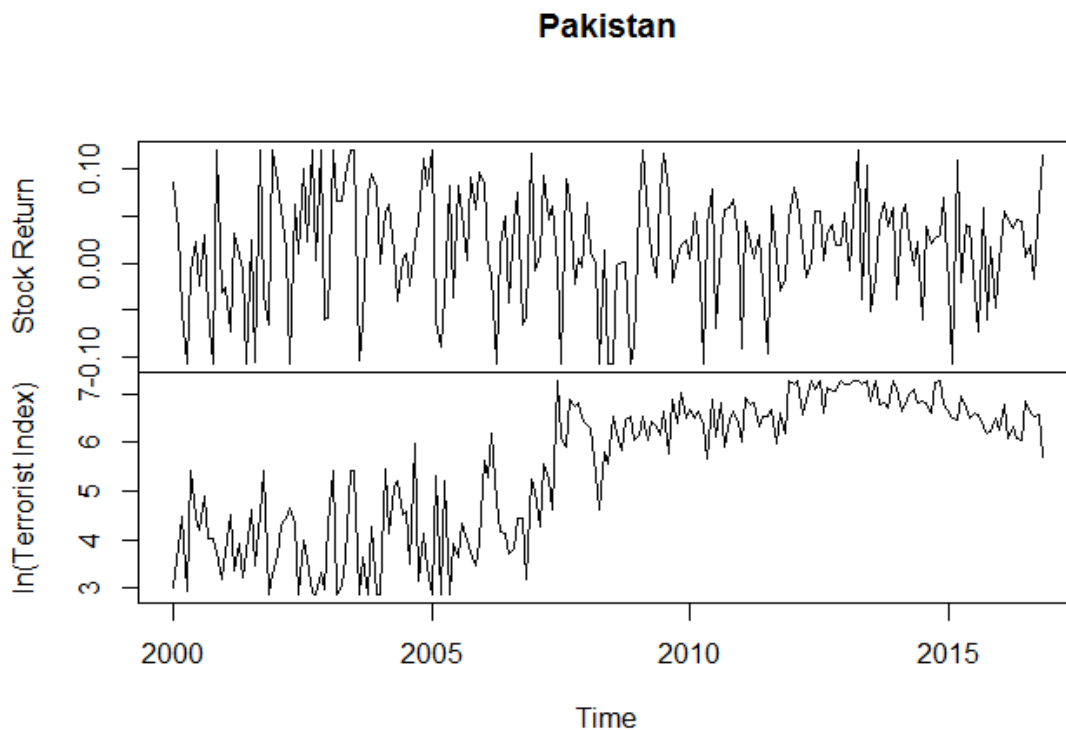
**Table 6:** Correlation

	pakr	paklnt	indr	indlnt	srir	srilnt	bangr
paklnt	0.0050						
indr	-0.2980***	-0.0240					
indlnt	-0.0370	0.2440***	-0.1220*				
srir	0.0960	-0.0760	0.1690**	0.0220			
srilnt	-0.1110	-0.3290***	-0.0180	-0.1210*	-0.0150		
bangr	0.3920***	0.0170	0.8770***	-0.0630	0.1390**	-0.0280	
banglnt	0.0340	0.2640***	-0.0760	0.2090***	-0.0020	-0.1830***	-0.0900

(This is pairwise correlation among variables in our study. As per standard rule \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$  which means that if our hypothesis is significant at 1%, 5% and 10% then it will show \*\*\*, \*\* and \* respectively)

Pakistan stock exchange returns has significant positive relationship with Indian and Bangladesh market but insignificant with Sri Lanka. Similarly, Pak Terrorist Index (TI) has significant positive relation with India and Bangladesh.

**Graph 1**



### Conditional Correlation and forecasts



**Table 7: DCC GARCH Fit**

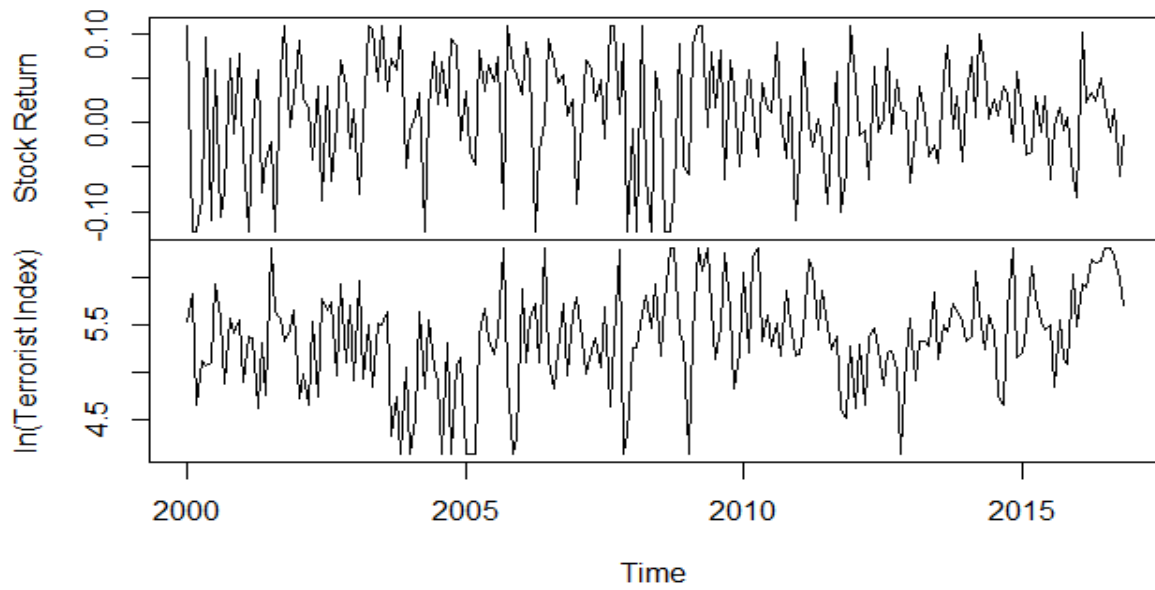
Distribution : mvnorm	Information Criteria
Model : DCC(1,1)	-----
No. Parameters : 13	Akaike 0.20936
[VAR GARCH DCC UncQ] : [0+10+2+1]	Bayes 0.42154
No. Series : 2	Shibata 0.20180
No. Obs. : 203	Hannan-Quinn 0.29520
Optimal Parameters	Elapsed time : 2.068694

	Estimate	Std. Error	t value	Pr(> t )
[Stock Return].mu	0.016574	0.003750	4.41936	0.000010
[Stock Return].omega	0.001780	0.002765	0.64367	0.519788
[Stock Return].alpha1	0.035454	0.013827	2.56418	0.010342
[Stock Return].beta1	0.941682	0.043826	21.48683	0.000000
[Stock Return].eta11	0.442302	0.372505	1.18737	0.235080
[ln(Terrorist Index)].mu	6.465556	0.050943	126.91806	0.000000
[ln(Terrorist Index)].omega	0.034166	0.023547	1.45095	0.146795
[ln(Terrorist Index)].alpha1	0.182853	0.065508	2.79132	0.005249
[ln(Terrorist Index)].beta1	0.785072	0.085867	9.14284	0.000000
[ln(Terrorist Index)].eta11	0.142233	0.088449	1.60807	0.107820
[Joint]dcca1	0.012596	0.026027	0.48396	0.628416
[Joint]dccb1	0.906009	0.049426	18.33063	0.000000

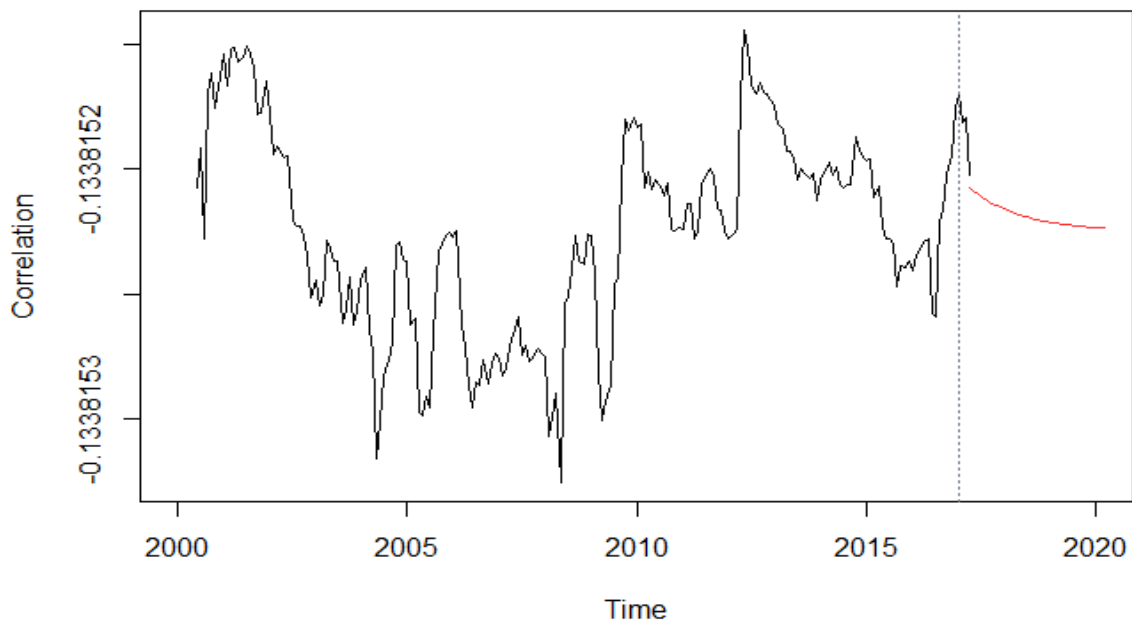
There is significant relationship between terrorist attacks and stock market return in Pakistan.

Graph 2 Indian Stock market return and Terrorist Index

### India



### Conditional Correlation and forecasts



**Table 8:** DCC GARCH Fit INDIA

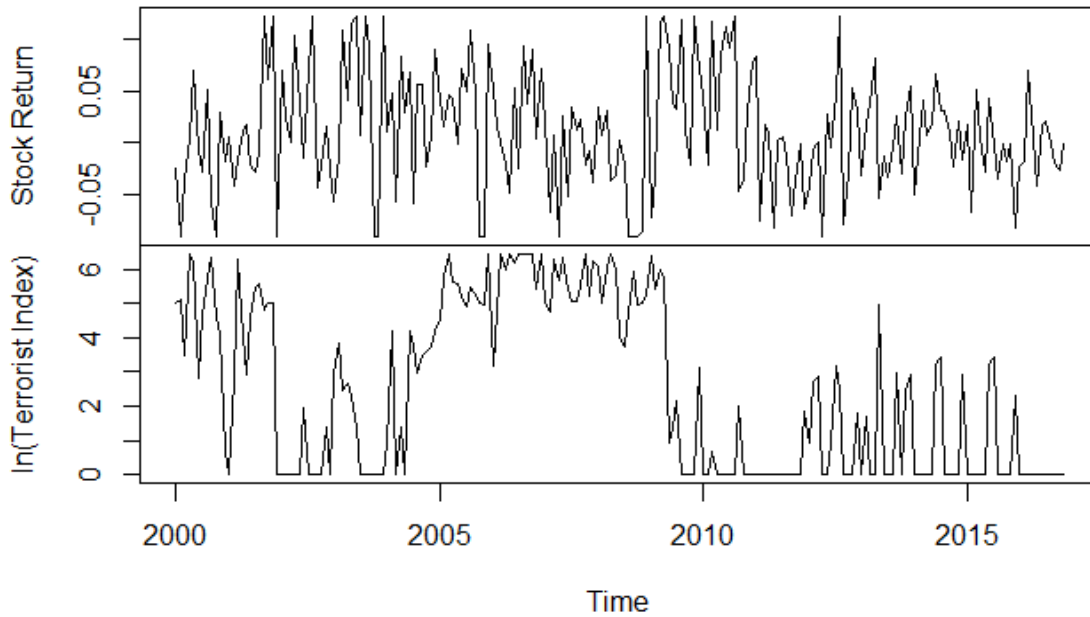
Distribution : mvnorm	Information Criteria
Model : DCC(1,1)	-----
No. Parameters : 13	
[VAR GARCH DCC UncQ] : [0+10+2+1]	Akaike -1.07183
No. Series : 2	Bayes -0.85965
No. Obs. : 203	Shibata -1.07939
Log-Likelihood : 121.7904	Hannan-Quinn -0.98599
Av.Log-Likelihood : 0.6	Elapsed time : 7.110123

## Optimal Parameters

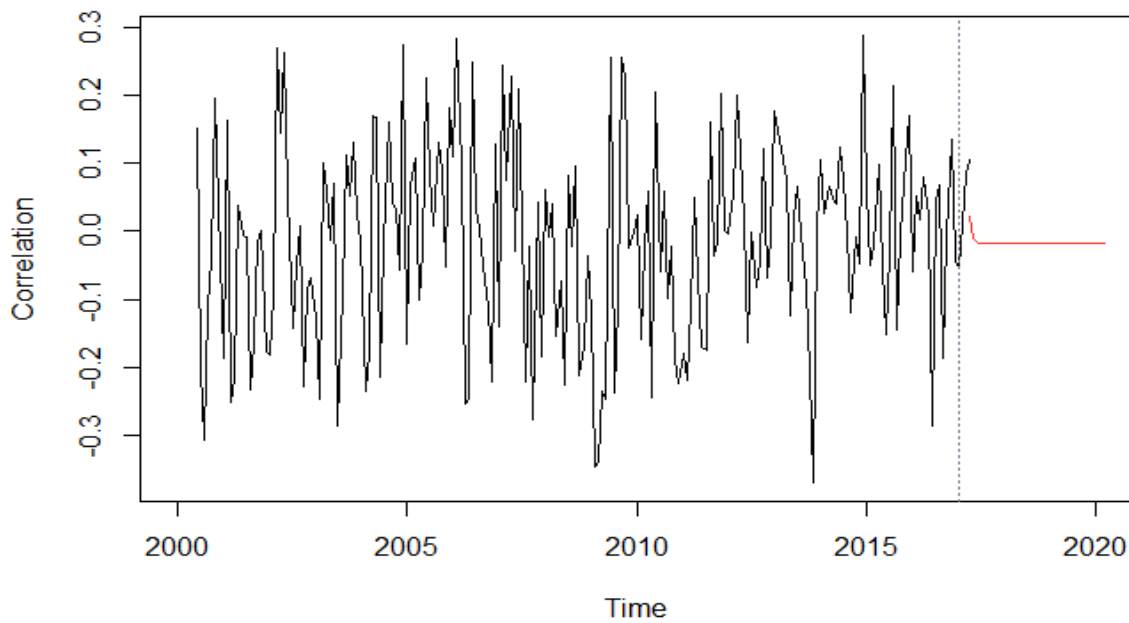
	Estimate	Std. Error	t value	Pr(> t )
[Stock Return].mu	0.008854	0.004239	2.08857	0.036747
[Stock Return].omega	0.004388	0.006074	0.72242	0.470034
[Stock Return].alpha1	0.095067	0.039891	2.38314	0.017166
[Stock Return].beta1	0.848997	0.122933	6.90619	0.000000
[Stock Return].eta11	0.058542	0.231042	0.25338	0.799971
[ln(Terrorist Index)].mu	5.356141	0.039400	135.94126	0.000000
[ln(Terrorist Index)].omega	0.026924	0.025835	1.04213	0.297350
[ln(Terrorist Index)].alpha1	0.056766	0.035655	1.59210	0.111362
[ln(Terrorist Index)].beta1	0.906728	0.065152	13.91716	0.000000
[ln(Terrorist Index)].eta11	0.092044	0.231250	0.39803	0.690608
[Joint]dcca1	0.000000	0.000003	0.00627	0.994998
[Joint]dccb1	0.926668	0.524998	1.76509	0.077549

There is significant relationship between terrorist attacks and stock market return in India.

**Srilanka**



**Conditional Correlation and forecasts**



**Table 7: DCC GARCH Fit SRI Lanka**

Distribution : mvnorm	Information Criteria
Model : DCC(1,1)	
No. Parameters : 13	
[VAR GARCH DCC UncQ] : [0+10+2+1]	
	Akaike 1.5667



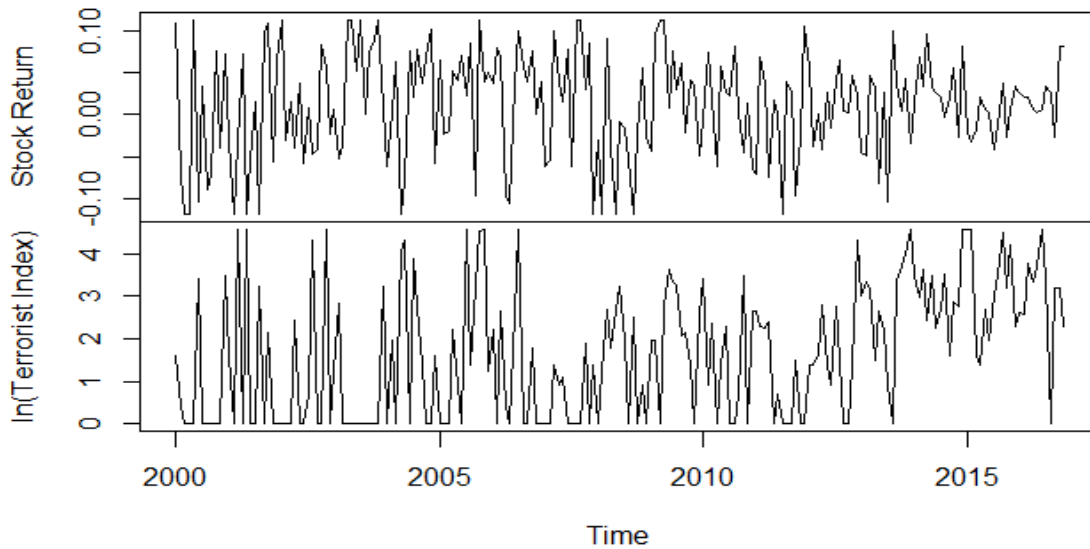
No. Series : 2	Bayes 1.7788
No. Obs. : 203	Shibata 1.5591
Log-Likelihood : -146.015	Hannan-Quinn 1.6525
Av.Log-Likelihood : -0.72	Elapsed time : 5.569953

Optimal Parameters

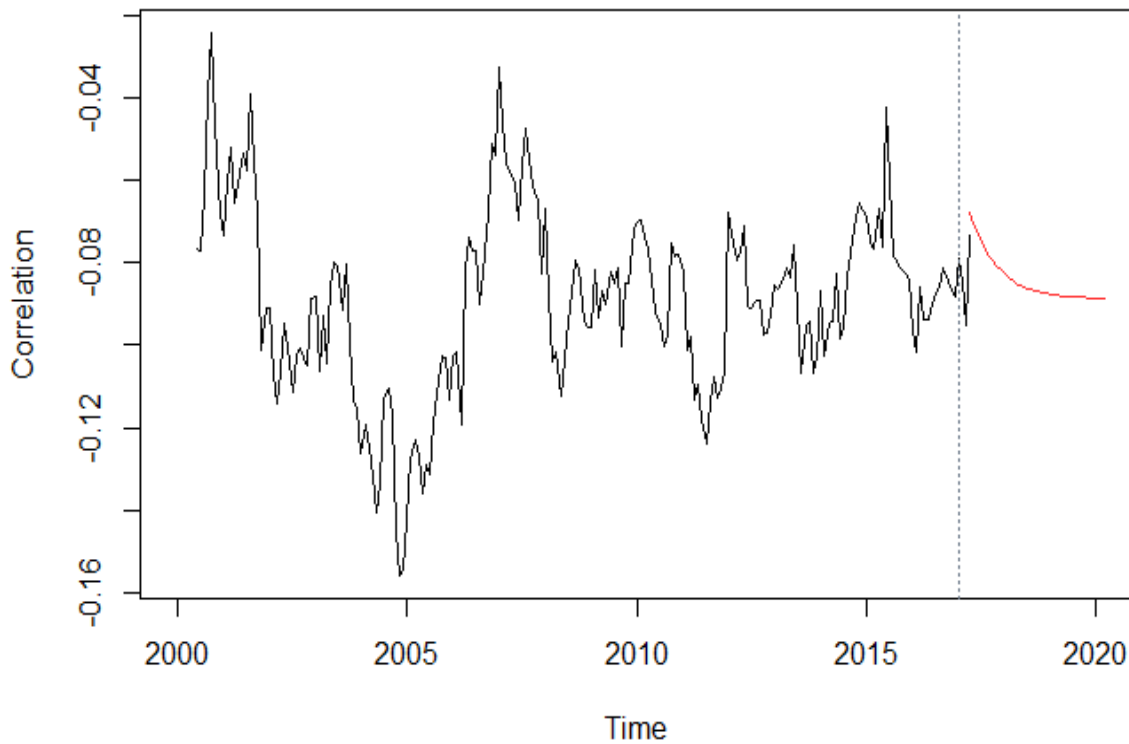
	Estimate	Std. Error	t value	Pr(> t )
[Stock Return].mu	0.009289	0.004058	2.28880	0.022091
[Stock Return].omega	0.007797	0.006980	1.11712	0.263944
[Stock Return].alpha1	0.122311	0.040744	3.00191	0.002683
[Stock Return].beta1	0.762417	0.135734	5.61701	0.000000
[Stock Return].eta11	-0.105971	0.182743	-0.57989	0.561991
[ln(Terrorist Index)].mu	1.081743	0.267391	4.04554	0.000052
[ln(Terrorist Index)].omega	1.262180	0.373493	3.37939	0.000726
[ln(Terrorist Index)].alpha1	0.325864	0.203691	1.59980	0.109643
[ln(Terrorist Index)].beta1	0.000000	0.163272	0.00000	1.000000
[ln(Terrorist Index)].eta11	-1.000000	1.049934	-0.95244	0.340873
[Joint]dcca1	0.163819	1.044549	0.15683	0.875377
[Joint]dccb1	0.000000	6.981642	0.00000	1.000000

There is insignificant relationship between terrorist attacks and stock market return in Sri lanka.

**Bangladesh**



### Conditional Correlation and forecasts



**Table 9: DCC GARCH Fit Bangladesh**

Distribution : mvnorm	Information Criteria
Model : DCC(1,1)	Akaike 1.0391
No. Parameters : 13	Bayes 1.2512
[VAR GARCH DCC UncQ] : [0+10+2+1]	Shibata 1.0315
No. Series : 2	Hannan-Quinn 1.1249
No. Obs. : 203	Elapsed time : 5.002528
Log-Likelihood : -92.464	
Av.Log-Likelihood : -0.46	

#### Optimal Parameters

	Estimate	Std. Error	t value	Pr(> t )
[Stock Return].mu	0.010648	0.003831	2.77946	0.005445
[Stock Return].omega	0.004271	0.002986	1.43052	0.152569
[Stock Return].alpha1	0.163813	0.054490	3.00629	0.002645
[Stock Return].beta1	0.792481	0.076033	10.42286	0.000000
[Stock Return].eta11	0.068411	0.162334	0.42142	0.673450
[ln(Terrorist Index)].mu	1.618416	0.230638	7.01712	0.000000
[ln(Terrorist Index)].omega	0.084046	0.114350	0.73499	0.462346
[ln(Terrorist Index)].alpha1	0.056126	0.029768	1.88546	0.059368
[ln(Terrorist Index)].beta1	0.896545	0.090593	9.89638	0.000000
[ln(Terrorist Index)].eta11	-0.125187	0.167417	-0.74775	0.454608
[Joint]dccal	0.011194	0.033314	0.33600	0.736869
[Joint]dccbl	0.857881	0.076446	11.22210	0.000000

There is highly significant relationship between terrorist attacks and stock market return in Bangladesh.

## **5. Conclusion**

The purpose of the study is to examine the impact of terrorism on stock markets of South Asia namely KSE 100 index of Pakistan, Bombay Stock Exchange of India, Colombo Stock Exchange of Sri Lanka and Chittagong Stock Exchange of Bangladesh with the help of GARCH methodology. The daily terrorism index for the period January 2000 to December 2016 was developed on the same pattern of Global Terrorism Data Base (2015) that was later on converted to monthly index and monthly stock market index was obtained from the data base.

The results show that there is highly significant but negative impact of terrorism on the stock markets of Pakistan, India, Sri Lanka and Bangladesh and there is a spillover effect of terrorist attack in one country to the stock markets of other countries. Results are in the same line with G.Andrew, karolyi and Rodolfo Martell, (2006); Alam (2013); Aslam and Kang (2013); Ramiah and Graham (2013).

This research will open new horizons for the researchers of South Asia. As there is no prior study which elucidate the impact of terrorism of stock markets of South Asia. So the researchers may explore the new dimensions of the topic and discover new methods to research. The stock markets of South Asia can get benefit from this research that they now came to the results that terrorism can affect the stock markets so they can be more attentive to take serious measure to minimize impact of the terrorists' attacks to stabilize the stock markets.

The investors can also be benefited from this research because this research suggests that terrorism attacks have negative impact on the stock markets of the country of attack and have positive impact on the stock markets of the other countries because of the spillover effect. So, investors will not invest in the country of attack instead they will invest in the other countries to gain the yields. On the same way, investors, financial institutions and securities agencies and governments can take preventive activities to reduce the risk and to mitigate the impact of terror and to combat the terrorism.

### **5.1 Limitations and Future Research**

There are six countries in South Asia, namely, Pakistan, India, Bangladesh, Sri Lanka, Bhutan and Nepal. But only four countries like, Pakistan, India, Bangladesh, Sri Lanka was taken into consideration because of the unavailability of stock data of the Bhutan and Nepal stock exchanges. Therefore, in future researchers may incorporate all the six countries of South Asia in the research.

The period of sixteen years from January, 2000 to December, 2015 was taken into accounts for analysis, but in future, researchers may expand this tenure for further analysis.

To examine the impact of terrorism on stock markets of South Asia, stock market index calculated on the basis of stock market return was taken into consideration but in future, researchers may include the returns of listed companies in the stock exchanges of South Asia. In future, researchers may examine the impact of terrorism on profitability of the listed companies in the stock exchanges of South Asia. GARCH methodology with panel data for overall analysis and time series data for individual country's analysis was used. In future, researchers may opt the different methodology for analysis.

There are many other reasons for the change in the value of market index but terrorism is one of them that is increasing day by day and spreading every moment with new tactics. There could be other variables like politics, economy, inflation, GDP, education and others that can influence the stock markets of South Asia. Therefore, for future research, these variables can be tested by the researchers to examine the impact of terrorism on stock markets of South Asia.

In this study impact of terrorism on stock market and spillover effect of terrorism was observed, whilst, in future, researchers may examine the impact of terrorism on stock return volatility. Terrorism incidents and country attributes may also be examined by the researchers in future. In this study, impact of terrorism on stock market has been tested but in future, researchers may examine the impact of terrorism on financial institutions and on economies of South Asia.

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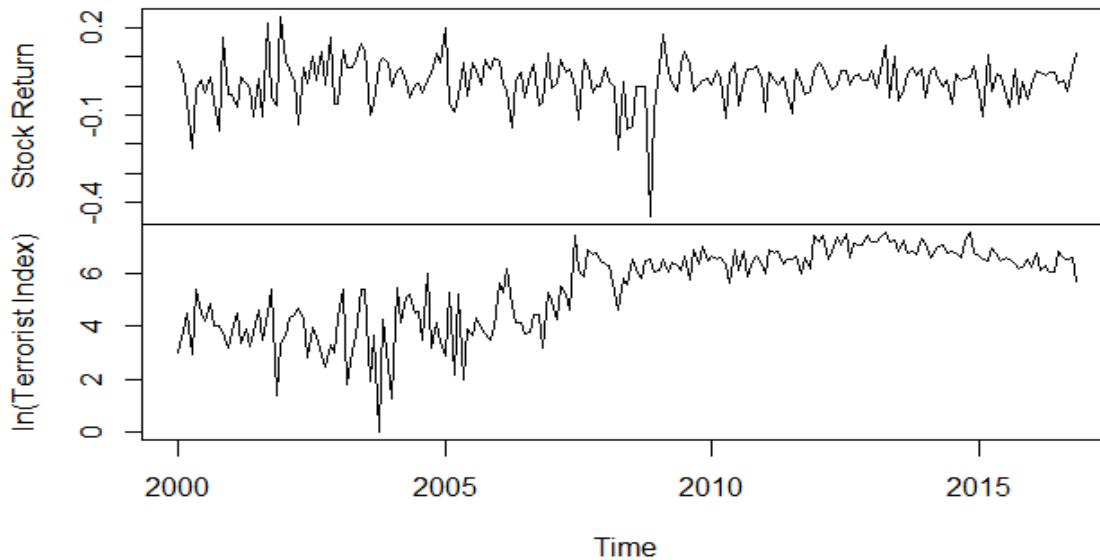
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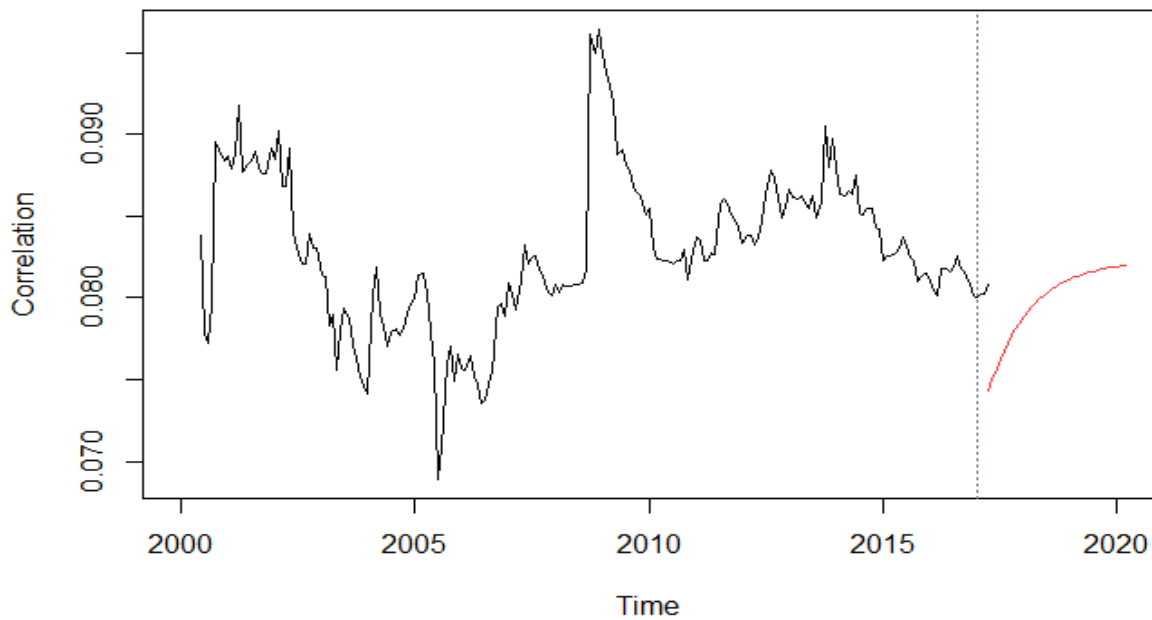
### Appendixes

#### Robustness of Model (Actual data without winzORIZATION)

##### Pakistan



### Conditional Correlation and forecasts



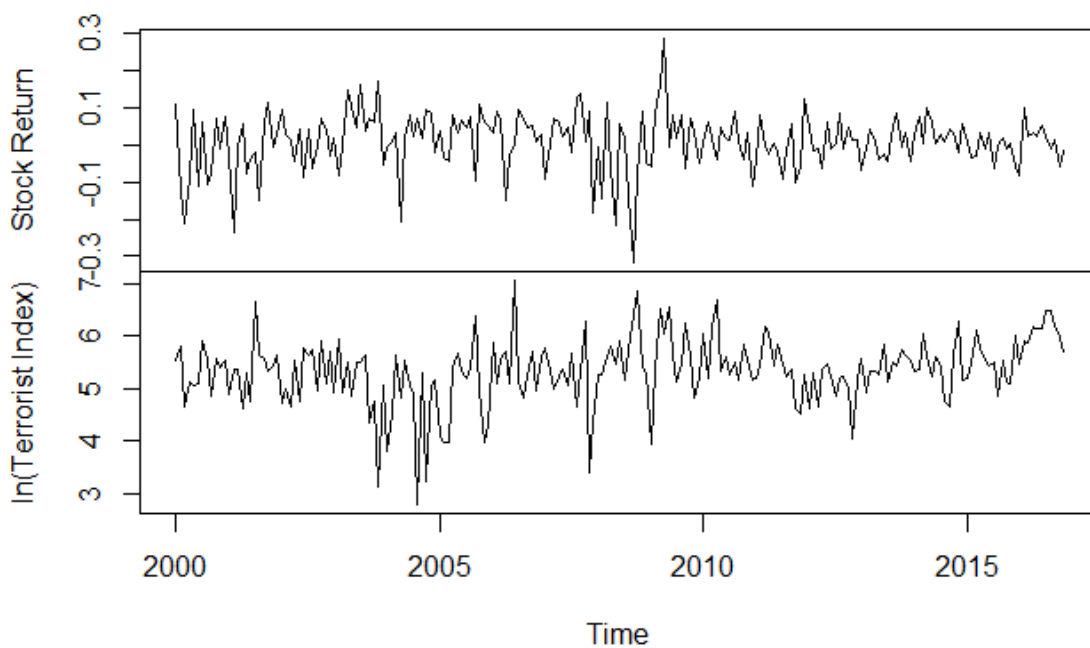
#### DCC GARCH Fit Pakistan

Distribution	: mvnorm	Information Criteria	
Model	: DCC(1,1)	-----	
No. Parameters	: 13	Akaike	0.76107
[VAR GARCH DCC UncQ]	: [0+10+2+1]	Bayes	0.97325
No. Series	: 2	Shibata	0.75351
No. Obs.	: 203	Hannan-Quinn	0.84691
Log-Likelihood	: -64.24872	Elapsed time	: 2.066293
Av.Log-Likelihood	: -0.32		

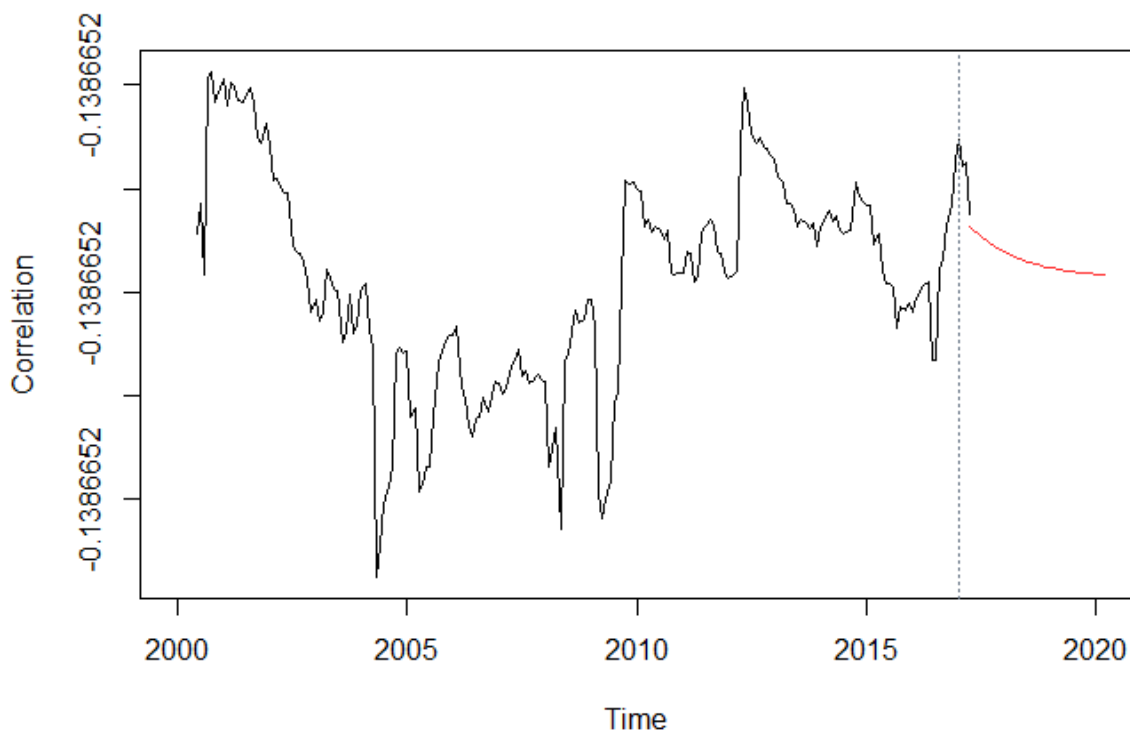
#### Optimal Parameters

	Estimate	Std. Error	t value	Pr(> t )
[Stock Return].mu	0.017955	0.005268	3.408131	0.000654
[Stock Return].omega	0.005299	0.006781	0.781471	0.434525
[Stock Return].alpha1	0.063358	0.033677	1.881355	0.059924
[Stock Return].beta1	0.882296	0.086169	10.239111	0.000000
[Stock Return].eta11	0.887945	0.580459	1.529729	0.126084
[ln(Terrorist Index)].mu	6.462133	0.048144	134.226143	0.000000
[ln(Terrorist Index)].omega	0.034128	0.022089	1.545045	0.122335
[ln(Terrorist Index)].alpha1	0.192076	0.060188	3.191280	0.001416
[ln(Terrorist Index)].beta1	0.783865	0.074003	10.592396	0.000000
[ln(Terrorist Index)].eta11	0.129752	0.091782	1.413694	0.157452
[Joint]dcca1	0.001665	0.018942	0.087915	0.929944
[Joint]dccb1	0.909292	0.072968	12.461476	0.000000

### India



### Conditional Correlation and forecasts





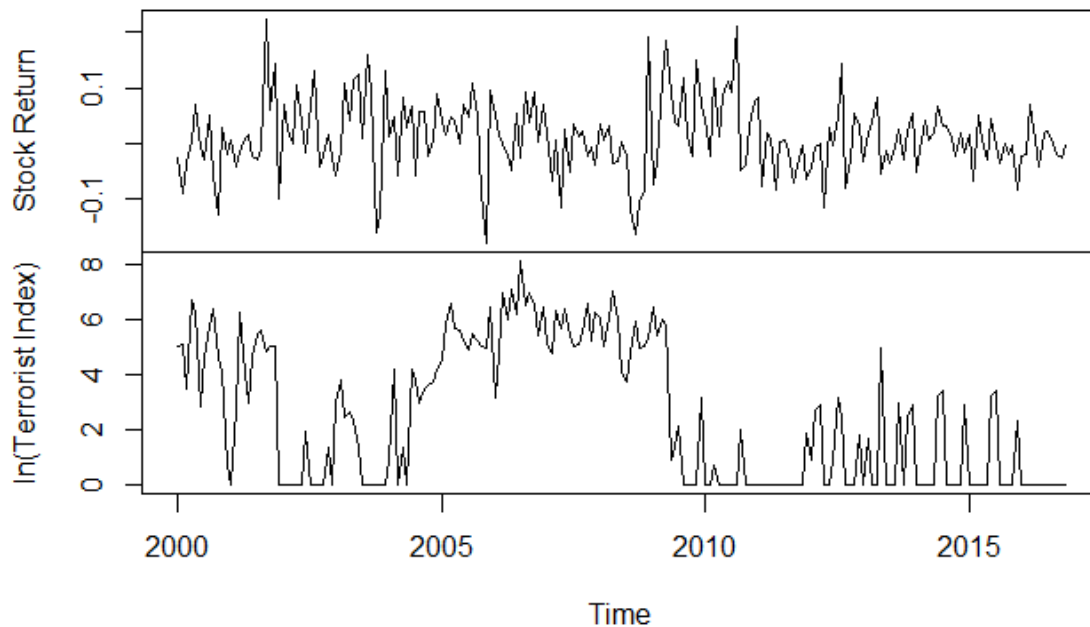
## DCC GARCH Fit India

Distribution	: mvnorm	Information Criteria
Model	: DCC(1,1)	
No. Parameters	: 13	Akaike -0.46494
[VAR GARCH DCC UncQ]	: [0+10+2+1]	Bayes -0.25276
No. Series	: 2	Shibata -0.47250
No. Obs.	: 203	Hannan-Quinn -0.37910
Log-Likelihood	: 60.19148	Elapsed time : 2.127512
Av.Log-Likelihood	: 0.3	

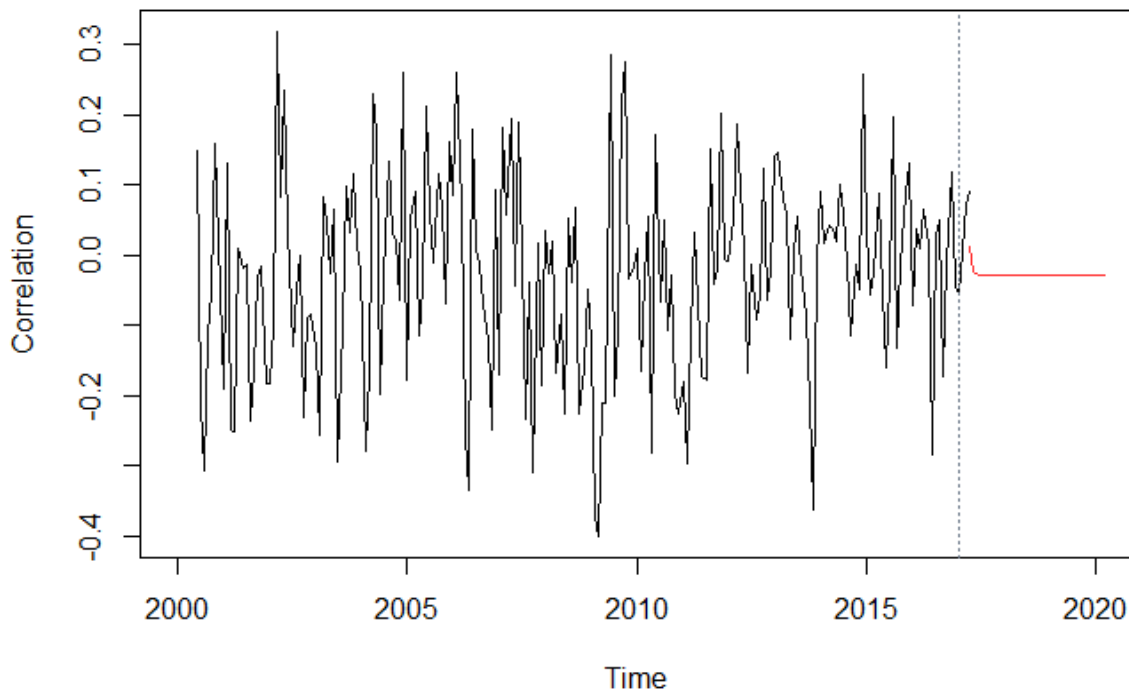
## Optimal Parameters

	Estimate	Std. Error	t value	Pr(> t )
[Stock Return].mu	0.007582	0.001439	5.269656	0.000000
[Stock Return].omega	0.002580	0.002649	0.973903	0.330105
[Stock Return].alpha1	0.149981	0.049338	3.039840	0.002367
[Stock Return].beta1	0.848864	0.058079	14.615639	0.000000
[Stock Return].eta11	0.020268	0.178267	0.113693	0.909481
[ln(Terrorist Index)].mu	5.364575	0.046095	116.380026	0.000000
[ln(Terrorist Index)].omega	0.027692	0.034592	0.800522	0.423408
[ln(Terrorist Index)].alpha1	0.091624	0.062811	1.458723	0.144641
[ln(Terrorist Index)].beta1	0.890188	0.092178	9.657307	0.000000
[ln(Terrorist Index)].eta11	0.232068	0.219348	1.057990	0.290060
[Joint]dcca1	0.000000	0.000002	0.002329	0.998142
[Joint]dccb1	0.928884	0.520602	1.784251	0.074383

## Srilanka



### Conditional Correlation and forecasts



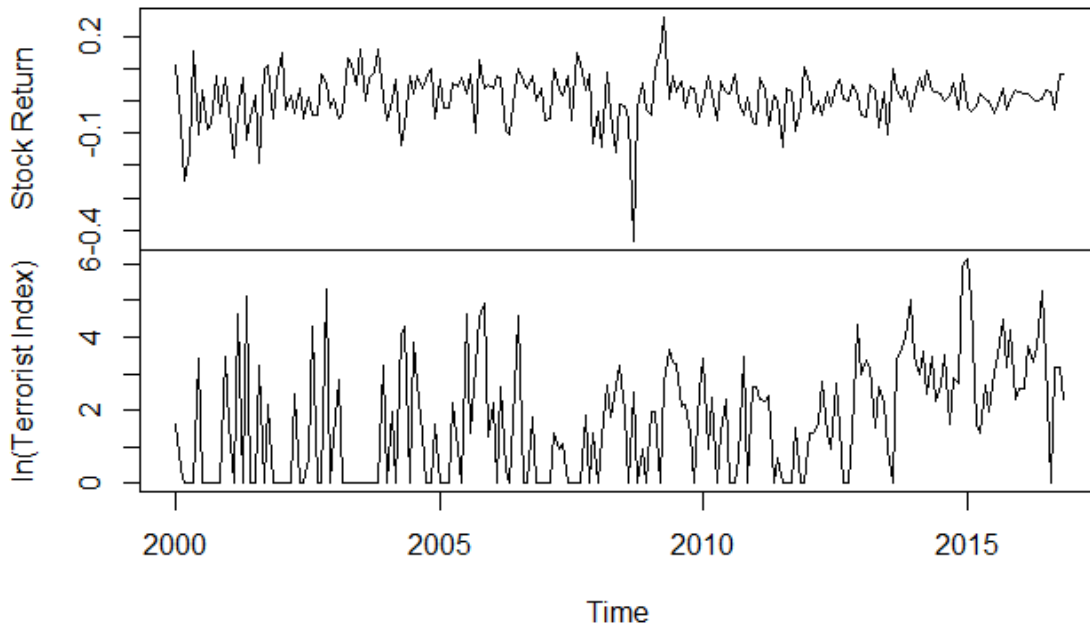
#### DCC GARCH Fit Sri Lanka

Distribution	: mvnorm	Information Criteria	
Model	: DCC(1,1)	Akaike	1.8523
No. Parameters	: 13	Bayes	2.0645
[VAR GARCH DCC UncQ]	: [0+10+2+1]	Shibata	1.8447
No. Series	: 2	Hannan-Quinn	1.9381
No. Obs.	: 203	Elapsed time	: 5.638031
Log-Likelihood	: -175.0097		
Av.Log-Likelihood	: -0.86		

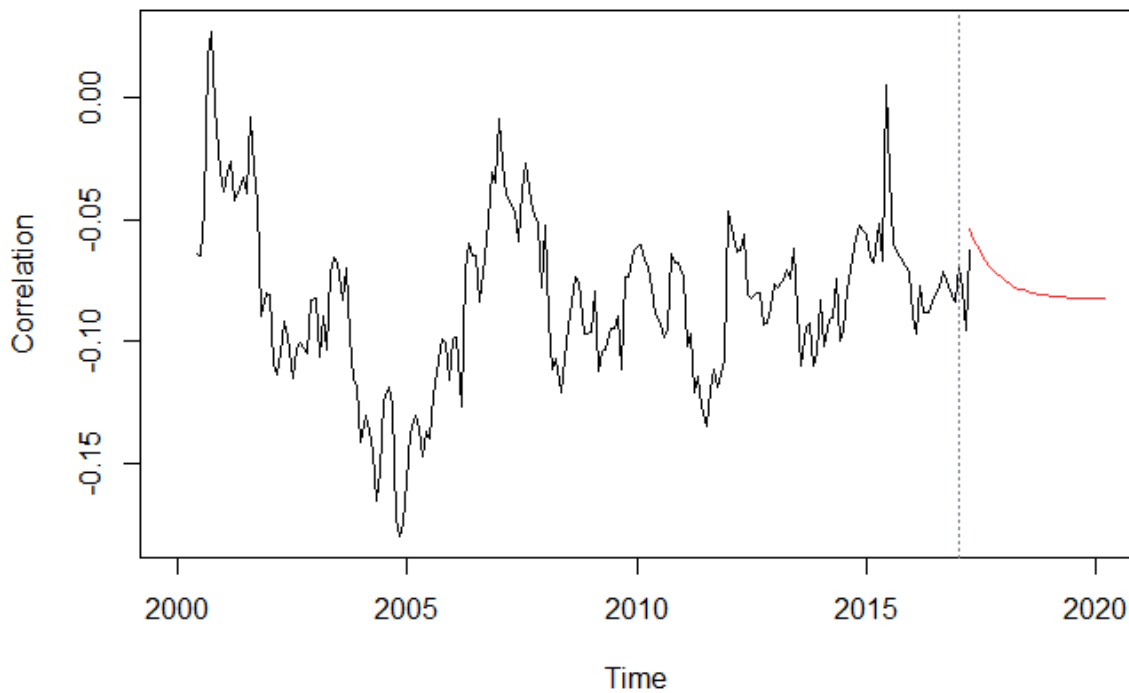
#### Optimal Parameters

	Estimate	Std. Error	t value	Pr(> t )
[Stock Return].mu	0.011332	0.004610	2.458375	0.013957
[Stock Return].omega	0.016044	0.010158	1.579492	0.114223
[Stock Return].alpha1	0.181895	0.064058	2.839536	0.004518
[Stock Return].beta1	0.614907	0.163990	3.749652	0.000177
[Stock Return].eta11	-0.039363	0.184308	-0.213570	0.830882
[ln(Terrorist Index)].mu	1.075850	0.251581	4.276353	0.000019
[ln(Terrorist Index)].omega	1.260296	0.350264	3.598129	0.000321
[ln(Terrorist Index)].alpha1	0.330176	0.180367	1.830577	0.067164
[ln(Terrorist Index)].beta1	0.000000	0.160626	0.000001	0.999999
[ln(Terrorist Index)].eta11	-1.000000	0.952055	-1.050359	0.293553
[Joint]dcca1	0.169446	0.164603	1.029418	0.303283
[Joint]dccb1	0.000000	0.769445	0.000000	1.000000

### Bangladesh



### Conditional Correlation and forecasts



#### DCC GARCH Fit Bangladesh

Distribution	: mvnorm	Information Criteria
Model	: DCC(1,1)	-----
No. Parameters	: 13	
[VAR GARCH DCC UncQ]	: [0+10+2+1]	Akaike 1.4491

No. Series	: 2	Bayes	1.6612
No. Obs.	: 203	Shibata	1.4415
Log-Likelihood	: -134.0808	Hannan-Quinn	1.5349
Av.Log-Likelihood	: -0.66	Elapsed time	: 5.570947

## Optimal Parameters

	Estimate	Std. Error	t value	Pr(> t )
[Stock Return].mu	0.010942	0.003914	2.7957	0.005179
[Stock Return].omega	0.002814	0.002055	1.3695	0.170844
[Stock Return].alpha1	0.221417	0.074890	2.9566	0.003111
[Stock Return].beta1	0.793481	0.054765	14.4887	0.000000
[Stock Return].eta11	0.270398	0.197355	1.3701	0.170654
[ln(Terrorist Index)].mu	1.589794	0.134973	11.7786	0.000000
[ln(Terrorist Index)].omega	0.097171	0.126098	0.7706	0.440944
[ln(Terrorist Index)].alpha1	0.068509	0.045160	1.5170	0.129260
[ln(Terrorist Index)].beta1	0.880476	0.107798	8.1678	0.000000
[ln(Terrorist Index)].eta11	-0.209964	0.193845	-1.0832	0.278740
[Joint]dcca1	0.017591	0.033829	0.5200	0.603066
[Joint]dccb1	0.846401	0.075416	11.2231	0.000000