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Terrorist Activities, Investor Sentiment, and Stock Returns: Evidence from Pakistan

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ABSTRACT

Motivated by the previous literature on investor sentiment and assuming that terrorist activities affect investor mood, this study attempts to address the psychological impact of terrorism for investors in Pakistan stock market. Apart from a direct economic loss, major terrorist incidents create/exacerbate uncertainty and fear in the market. The investors are likely to over-respond to such incidents and once the dust settles the market tend to recover. The analysis of cumulative abnormal returns in the aftermaths of terrorist incidents and the volume analysis provide strong evidence that the terrorist incidents adversely affect investors' sentiments and confidence in the market as manifested through relatively feeble trading volumes.

Keywords: Sentiment, Terrorism, Stock Market, Pakistan

JEL classifications: C33, E44, G15

1. INTRODUCTION

The convenience of purchasing and selling stocks causes greater sensitivity in the stock prices to the arrival of some new information. This phenomenon is more witnessed when any unexpected incident happens, particularly when any large-terrorist attack occurs. For example, the value of Morgan Stanley Capital International (MSCI) World Index declined by 1.98% on the day of the terrorist attack at World Trade Centre, New York on September 11, 2011, despite the fact that U.S. Stock market was closed. Another loss of 2.57% was witnessed when U.S. market opened again on September 17. Likewise, on the day of Madrid incident on March 11, 2004, MSCI lost 1.72% of its value. Shortly, the two pieces of information about terrorist activities to a substantial market reaction.

Investor's sentiment is regarded as an attitude towards a particular stock or financial market. It is the sensitivity of a market, or its group psychology, as revealed by the events and price movements of securities traded on the market. The rising price will show the bullish trend of the market, while the falling price means the bearish market sentiment. Traders and technical analysts often advocate the imperative use of technical indicators to measure and profit, because investors' attitudes towards securities frequently cause short-term price variations (Drakos, 2010). Market sentiment is also substantial for potential investors. They tend to trade in the opposite direction of mainstream sentiment. For example, if everyone is buying, the reverse trader will sell. Investor sentiment is often described as bearish or bullish. When the bear market is in control, stock prices are falling. When the bull is controlled, the

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stock price is rising (Chang and Zeng, 2011). Emotions drive the market, so investor sentiment is not always synonymous with the basic values. Alternatively, market sentiment is about emotions and feelings, and the basic value is about corporate performance.

Traders earn by finding stocks that are overvalued or undervalued based on market sentiment. Investors and traders use several indicators to compute market sentiment to determine the best stock trading. Because of the liquidity of trading volume, it is regarded as an emotional agent (Yang et al., 2016). If costly short selling is expected, irrational investors are important, which will enhance their liquidity in response to their optimism and the prosperity of the stock market; and vice versa. The turnover rate of the market is counted as a proxy variable (Chang and Zeng, 2011).

Emotions¹ can facilitate decision-making by controlling avoidable interruptions, leading to better quality decision making without exclusive rational thinking. When trading takes place for stock prices at a low level, this means traders have bearish market sentiment (Yang et al., 2016). When stock prices are at a high level, shows traders' bullish market. These events remind us that terrorism is a crucial geopolitical risk that impacts the global economy and financial markets. The direct impact of terrorist attacks on financial and commodity markets can be predicted, as this will lead to an increase in investors' risk aversion (Nikkinen and Vähämaa, 2010). The market response is also in line with the economic impact of medium-term and long-term terrorism expectations: By reducing confidence and increasing the risk aversion of consumers and businesses, the economic slowdown is triggered by reducing consumption and real investment activities, if not complete recession can spread to other stock markets, fixed income market yields, currencies, and even other commodity markets (Urquhart and Hudson, 2016).

The psychological fear of terrorism has a potential impact on economic behaviour. For investors, companies and government decision-makers, it is crucial to understand the extent of the impact of terrorist acts; they can choose how to incorporate the risk of terrorist attacks into the value of publicly listed companies. A company should understand the importance of terrorism risk

¹ Emotion is a combination of simple and intricate psychological evaluation processes that lead to the emotional state of the body as an additional psychological change (Drakos, 2010); High/low sentiment indicators compare the number of stocks at 52 weeks high with the 52-week low stock numbers.

insurance, while it is also important for governments to support the insurance industry, which may hesitate to fund these insurance projects under reasonable premiums that respond to a wide range of attacks (Burch et al., 2003).

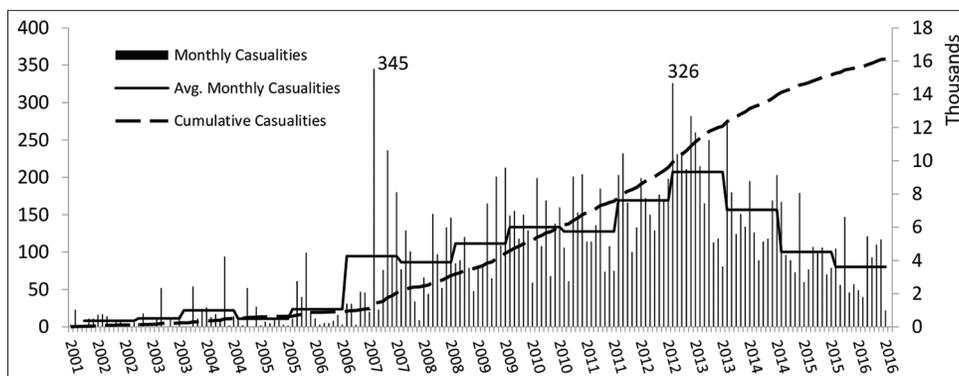
Following the 9/11 terrorist attack, Afghanistan once again became the focus of conflict and militancy. Only this time the war zone was not limited to Afghanistan. As Pakistan became a US ally in the war against terrorism, militant groups treated the country as a direct adversary. The already precarious situation exacerbated when Pakistan's military led government killed a score of militants and non-militant students in a highly broadcasted operation in Lal Masjid seminary of the capital city of Islamabad, in July 2007. In the aftermaths of the Lal Masjid incident, a number of militant groups merged in December 2007 into one larger organization, namely Tahrir-e-Taliban, which declared Pakistan state and the army as its arch enemy. They vigorously attacked Pakistan's state installations and military personnel. Also, indiscriminate terrorist attacks on general public and notable public figures became commonplace. The following Figure 1 depicts the monthly deaths toll of terrorist incidents from November 2001 to December 2016.

2. LITERATURE REVIEW

Efficient market hypothesis advocates that the price of a stock reflects all possible information about the future. However, this share price can shift from the fundamental value if any good news or bad news related to the economy happens. One of the main driving event indicators is the terrorist act. By the act of terrorism, not only the physical property is damaged but also the investor's sentiments are shattered (Drakos, 2010). Many previous types of research focused on the investor's moods that are correlated with the stock returns. An incident of the major negative event can cause investment to be riskier hence the financial markets becomes sluggish (Loewenstein et al., 2008).

Blomberg et al. (2011) investigated the relationship between trust and terrorist activities. 179 countries were studied from 1968 to 2007. The analysis tools used were the unit root test, the Augmented Dickey-Fuller test, AARCH and GAARCH models. According to the authors, terrorism results in underinvestment in the envelope of trust. Also, terrorism had a negative effect on individual income level. Melnick and Eldor (2010) have conducted unique research on the impact of media coverage of

Figure 1: Monthly and cumulative casualties from terrorism in Pakistan (2001-2016)



terrorist attacks on the returns on the Tel Aviv stock exchange. An event window was created to measure the extent of bad news on the market. It was found that terrorism damages the sentiments of the investors. Similarly, Singh (2013) used a micro level from agriculture survey to find out the effect of terrorism on the short-term and long-term investment in agriculture technology. The results suggested that farmers were reluctant to invest for the long term when they were located near the border or disputed areas.

Filer and Stanišić (2016) explored the relationship between terrorism and foreign direct investment in a sample of 160 countries over 25 years. The data was collected from the global terrorist database. The Granger causality test was done to establish the relationship. The foreign investors become reluctant to invest in the countries facing terrorism. The results also showed a negative spillover effect of terrorism on FDI with neighbouring countries. Nikkinen and Vähämaa (2010) research how investors felt about terrorism by analyzing this behaviour through probability density functions in the FTSE 100 index. This experiment focused on the three major terrorist attacks: New York, Madrid, and London and how they affected the stock market. There was a strong negative on how people reacted to these acts - a much lower expected value in the FTSE 100 index, coupled with greater market uncertainty, resulted (Hassan and Hashmi, 2015).

Burch et al. (2003) used the 9/11 event as the basis of their study and measure its impact on small investors sentiments in the mutual fund's industry. Event study was taken as the main methodology with event window before and after the 9/11 attack was analyzed. The results showed that the investors' reluctance to invest in the mutual funds after the 9/11 event, a higher discount rate was imposed to encourage the investors. On the same note, Glaser and Weber (2007) explored the effect of 9/11 incidence which was a surprise on the individual investors expected returns and risk analysis. They adopted the questionnaire methodology which was sent by email to different online brokers. The results showed that after the 9/11 event, the individual investors become choosier about their investments and their forecast returns raised. They also report high expected future risk. Khalfaoui et al. (2015) have taken the Egyptian stock market as a natural experiment for their study on the effect of major events on investor's reaction. The study concluded that terrorists' activities have an adverse effect on investor's sentiments up to 3 days after the occurrence of such attacks.

Rigobon and Sack (2005) studied the effect of risk associated with Iraq war on different financial variables. Heteroskedastic based statistical techniques were applied. They concluded that the risk of government securities has increased over the war period. Investors were reluctant to invest because of uncertainty. These risks were eliminated only when the war was settled 3 months later. Hendricks and Singhal (2001) consider immediate emotional triggers in risky decision making. Research in the past used sunshine, sleep habits, temperature, daylight, lunar phases, and international soccer results and how they pertain to mood. The hypothesis is whether terrorist activity is also a variable that affects mood. Edmans et al. (2007) contend that in order to be a good indicator, the variable must meet three criteria as it relates to stock returns.

Nikkinen and Vähämaa (2010) researched how investors felt about terrorism by analyzing this behaviour through probability density functions in the FTSE 100 index. This experiment focused on the three major terrorist attacks: New York, Madrid, and London and how they affected the stock market. There was a strong negative result as a result of the attacks and how people reacted to them. There was a much lower expected value in the FTSE 100 index and much more market uncertainty as a result of the terrorist attacks.

Glaser and Weber (2007) investigated how investors felt through a survey both before and after 9-11 in New York. These results related to stock market expectations imply that investors expected higher returns after the attack. There are several theory trading models which try to shed light on the price-volume connection. The sequential information arrival model is one of the most basic theories related to volume. This model indicates that the highest volumes traded will be as a result of positive or negative thoughts among traders. This theory might shed light on why price-volume is strange when there is terrorism since terrorists affects the general population through their actions.

The existing research indicates that terrorism can create abnormal returns on an aggregate level of equity markets. In addition, there is also a differential effect on the overall economy as a result of terrorism. Along with military conflicts, transportation is weakened while defence companies are strengthened as a result of terrorism. Terrorism greatly impacts equity markets and the overall economy, so there is also an industrial differential impact on equity markets. Terrorism likely impacts volume. Abnormal traded volumes go along with abnormal fluctuations in price when it comes to such catastrophic events.

Pakistan financial markets are still on the emerging stage, with a weak level of market efficiency. The market generally follows the herding behaviour. In the event of terrorism, the stock market becomes volatile, investors lose confidence and returns decrease (Malik and Zaman, 2013). Alam (2013) investigated the correlation between terrorism and the stock market returns. They developed a terrorist impact factor, which was a unique methodology measurement. They concluded that the investors' confidence is lost after major terrorist attacks. Suleman (2012) conducted the study on Pakistan's market. The main purpose of the study was to explore the effect of terrorist news on the return and stock volatility in the Karachi stock exchange. The data was divided into two samples, good news and bad news. Johansson and Juselius (JJ) explored the long run impact. The results indicated a negative effect of terrorist news on investor sentiments, ultimately leading to suboptimal returns of Karachi stock exchange. Aksoy and Demiralay (2019) explored the effect of terrorist attacks on two economies namely Turkey and Pakistan. GARCH (1,1) was applied to measure the impact of two stock exchanges. The results showed that investors feel reluctant in the aftermath of the terrorist attacks, shown by the increase in volatility and reduced return (Gul et al., 2010).

Summing up, the terrorist activities adversely affect the investor's sentiments. Specifically, in the case of Pakistan where investment follows herding behaviour, the magnitude is much higher. Thus, we hypothesize that there exists a negative relationship between terrorism and investor sentiment in the Pakistan stock market.

This study contributes to the existing knowledge in many ways. First, it shows the how large terrorist attacks in Pakistan affect investor sentiment, which ultimately affects stock prices. Second, this study uses a more robust methodology of event analysis, i.e., it investigates individually the impact of four large terrorist attacks namely Benazir Bhutto Attack 2007, Pakistan Ordinance Factory attack 2008, All Saints Church attack 2013 and Army Public School attack 2014, by comparing the market reaction before and after each event. Lastly, the findings of this study reveal some important insights that can be extremely useful for the Governments and other Institutions in Pakistan for future policy making.

3. SAMPLE PERIOD AND DATASET

The selected sample period for this research dates from January 2002 to December 2016 (15 years). This period was chosen as it was a period when terrorism became more commonplace in the aftermaths of the 9/11 attacks and resultant global war against terrorism. Moreover, the selected period is also appropriate to test our hypothesis as it contains an initial period (2002 - 2007) of low terrorism followed by a sudden spike, as observable in the above Figure 1.

The vertical bars in Figure 1 presents the number of casualties in a given month. The highest number of casualties are recorded in July 2007 (the same month in which the Lal Masjid incident happened), when 345 people were killed. The second largest number of monthly casualties is reported in January 2013 when 326 people were killed in terrorist incidents. These figures do not include the number of terrorists killed in such incidents. 2013 was the deadliest year in which on average 207 people died each month, i.e., total of 2486 lives lost in terror-related incidents, and a much greater number of people were injured. In 2002, official statistics indicated the least number of deaths during the sample period. An average of above eight persons was killed, monthly, reaching an annual total of 99. From September 2001 till December 2016, a total of 16,121 people lost their lives to terrorism in Pakistan, the number of terrorists died not being included in the figure.

Daily data is obtained from the Global Terrorism Database (DTG)², which is maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism at the University of Maryland, U.S. It provides an extensive detail of each terrorism-related incident in all countries. Data related to the stock market is obtained from the online data portal of Pakistan Stock Exchange and the website of Business Recorder newspaper. The daily return, trading volume, and other related data are obtained at the individual stock level, industry level, and at the market level to perform analyses at each of these levels. Other macroeconomic variables are obtained from the data portal of the World Bank.

4. METHODOLOGY

4.1. Measuring Terrorism

Terrorism is a primary construct in this study. To measure terrorism, it is appropriate for this study to identify an appropriate

definition. There are a number of definitions of terrorism in the extant literature and each differs from the other. Laqueur (1996) defines terrorism as the sub-state application of violence or threatened violence intended to sow panic in a society, to weaken or even overthrow the incumbent. The Oxford Dictionary defines terrorism as:

“The unlawful use of violence and intimidation, especially against civilians, in the pursuit of political aims.”

In the context of Pakistan, terrorism has been an ongoing phenomenon during our selected period of analysis. A variety of events has been regarded as terrorist acts. The Global Terrorism Database provides an extensive list of events regarded as terrorism in the local or international media. Without going into a discussion about whether or not a violent act qualifies as an act of terrorism³, the study considers all the events listed in the Global Terrorism Database as acts of terrorism.

Terrorist acts differ in magnitude in a variety of dimensions. Some acts of terrorism have claimed more innocent lives than others. A terrorist act claiming few but relatively high-profile casualties may have a greater psychological impact than an act of terrorism occurring in far-fetched areas and claiming a greater number of general public deaths. So, in assessing the magnitude of an act of terror, the multiple dimensions of the act such as the number of deaths, injuries, the profile of the target, the locality, etc. are important to be considered. It also happens that a number of acts may happen on the same day or within a few days and creating a wave of terror among the people. So, we employ multiple dimensions of terrorist acts to assess the magnitude of terrorism and the level in the society. Individual measures are used with synthesized terrorism factor based on multiple dimensions of the acts.

4.1.1. Individual measures of terrorism intensity/magnitude

- **nKill_t**
It is the primary measure to assess the intensity of a given act of terror or the intensity of terrorism on a given day. nKill_t is defined as the number of persons killed in all acts of terrorism on a particular day and those terrorist acts being registered in the Global Terrorism Database. The calculation of nKill_t does not consider the number of terrorists or perpetrators killed in such incidents. A high value represents the high intensity of terrorism and vice versa.
- **nVictims_t**
nVictims_t is defined as the total number of people injured in terror-related incidents on a given day. The number of terrorists or perpetrators injured in such incidents is excluded in its calculation. nVictim_t is also a direct measure of terrorism and its higher value represents the relatively high magnitude of terrorism on a given day. nVictims_t is employed as a second measure of terrorism. However, we expect its

3 some may argue that militancy in a conflict zone may not be considered an act of terrorism: Given that Pakistan's border with Afghanistan is a conflict zone in which Afghan Jihadists are/were allegedly based and they carry gorilla strikes against US army and also some border areas were controlled by militias who acted against Pakistan and later combat operations were conducted against them

2 accessible at www.start.umd.edu/gtd

impact on the market to be less severe when compared with that of $nKill_t$.

• **Incidents_t**

The number of deaths resulting from terrorism on a given day can be a result of one giant attack or many small attacks or some combination of frequency and magnitude of attacks. It is thus appropriate to consider the frequency of terrorism-related incidents on a given day to assess more accurately the psychological impact. Thus, $incidents_t$ is a measurement of the number of terror-related incidents on a given day. $Incidents_t$ measures a dimension of terrorism which neither captured by $nKill_t$ nor by $nVictims_t$.

• **Terror_Wave**

To gain a complete picture of the state of terrorism in the society we need to go beyond the given day on which we intend to assess the prevalent state of terrorism in the society. The basic intuition is that if the terrorist acts a sparse and sporadic then it may have a different or less severe psychological impact than if the today’s terrorist attacks are a part of a wave of terrorism. Thus, we calculate a measure to assess the prevalent wave of terrorism based on the acts of the previous 30 calendar days. $Terror_Wave$ is the calculated aggregate of $nKill_t$ of the previous 30-calendar days. $nKill_t$ is defined earlier. A high value of $Terror_Wave$ represents a high instance of terror-related acts in the society during the past month.

4.1.2. **Terrorism factor**

The above-defined measures of terrorism (i.e., $nKill_t$, $nVictims_t$, $incidents_t$, and $Terror_Wave$) represent the individual dimensions of terrorism. Therefore, for assuring the robustness, a single measure, which incorporates multiple dimensions of terrorism, is synthesized; performing Principal Component Analysis (PCA)

to synthesize a single factor ($Terror_Factor$) while using $nKill_t$, $nVictims_t$, and $incidents_t$ as input variables. The results from PCA are tabulated in the following Table along with the descriptive statistics and correlation matrix of input variables and the output factor (i.e., the first principal component, $Terror_Factor$).

Part A in the above Table 1 presents the descriptive statistics of input variables used in the principal component analysis (PCA). During the period from January 2002 to December 2016, there are 2841 valid daily observations which are considered in this study. The days on which no terrorism-related event took place are excluded. The number of terrorism-related incidents occurred in Pakistan and recorded in Global Terrorism Database during this period is arguably greater than 2841 but events are aggregated daily to calculate the scale of terrorism on a given day. For further details please see the calculations of three input variables as explained previously.

The daily average of casualties from terrorism is 6.76 with a standard deviation of 12.09. The highest number of deaths reported on a given day is 162. The daily average of victims is 16.82 with a high of 450 on any given day. On average, 2.53 incidents occurred daily with the highest number of terrorist incidents being 21 on a single day.

Part B in Table 1 presents three components (Comp) from three input variables. Looking at the column headed Eigenvalue reveals that the Comp1 has the highest eigenvalue of 1.96. The sum of all the eigenvalues is equal to the number of input variables, suggesting that the three components generated based on three input variables totally explain the variation in original data of three input variables. However, these three components vary in their explaining of the total variation in the original data. The

Table 1: Terrorism factor using principal component analysis (January 2001-December 2016)

Part A: Descriptive statistics of input variables					
	Observations	Mean	Std. Dev.	Min.	Max.
$nKill_t$	2841	6.76	12.09	0	162
$nVictims_t$	2841	16.82	33.13	0	450
$Incidents_t$	2841	2.53	1.84	1	21
Part B: Results from principal component analysis					
	Eigenvalue	Difference	Proportion	Cumulative	
Comp1 (terrorism factor)	1.960	1.078	0.653	0.653	
Comp2	0.882	0.725	0.294	0.948	
Comp3	0.157		0.053	1.000	
Part C: Factor loading of Comp1 (terrorism factor)					
	Input variables				
	$nKill_t$	$Victims_t$	$Incidents_t$		
Terrorism factor	0.671	0.664	0.331		
Part D: Pearson’s correlation matrix					
	TerrorFactor_PCA	$nKill_t$	$Victims_t$	$Incidents_t$	
TerrorFactor_PCA	1				
$nKill_t$	0.94***	1			
$Victims_t$	0.93***	0.84***	1		
$Incidents_t$	0.46***	0.26***	0.22***	1	

This table presents the descriptive statistics, correlation matrix and factor loading of input variables used in factor analysis. Terrorism Factor is synthesized based on $nKill_t$, $Victims_t$, and $Incidents_t$. $nKill_t$ represents the number of casualties from terrorism-related incidents on a given day; $Victims_t$ represents the sum of casualties and injuries from terrorism-related incidents in a given day, and $Incidents_t$ represent the total number of terror-related incidents in a given day. The presented results are based on daily terrorism data from January 2002 to December 2016

eigenvalue 1.96 suggests that the Comp1 alone can describe the data variation equivalent to 1.96 of the input variables. The Comp2 and Comp3 combined together explain the variation equivalent to 1.04 of the input variables, suggesting that the Comp1 alone is almost equivalent to two input variables, explaining the total variability of the data in a three-dimensional plane. The last column in Panel B shows that the Comp1 explains about 65.3 % of the total variation of three input variables. Thus, we chose Comp1 as our representative variable which absorbs more than 65% variation of the data. Comp1 is thus our synthesized terrorism factor which absorbs the commonalities of nKill_t, nVictims_t, and incidents_t.

Part C of Table 1 presents the factor loadings of input variables over terrorism factor. As the three input variables are direct measures of terrorism, they all have positive loadings over terrorism factor. Thus, the higher values of Terrorism Factor represent the higher magnitude of terrorism on a given day.

Part D of Table 1 presents the Pearson's correlation matrix of terrorism factor and three input variables. The terrorism factor is, as expected, significant and positively correlated with all three input variables. The input variables are also, as expected, similarly correlated with each other.

4.2. Effect of Terrorist Attacks on Investors' Sentiment and Confidence

To determine the significance of the effect on investors' sentiment and confidence in the stock market, and in accordance with existing literature, trade volume are applied, particularly abnormal trading volume, as measures of investors' sentiment in the aftermaths of a given terrorist incident (Baker and Wurgler, 2007). The abnormal trading volume is the 30 days mean adjusted volume on a given day computed as follows.

$$\text{AbnVolume}_{m,t} = \text{Volume}_{m,t} - \frac{1}{D} \sum_{t=-1}^{D-30} \text{Volume}_m$$

Where volume is the total number of shares traded in the market on a given day; AbnVolume is the deviation of the day's volume from the mean volume of previous 30 trading days. The 30 trading days are employed in the calculation of abnormal volume because the terrorist incidents are a frequent matter during our sample period in Pakistan and longer periods may incorporate the effects of the previous terrorist incident, and thus render the analysis invalid. We expect that the AbnVolume will be significantly negative on the trading days immediately after the terrorist incidents (Dow and da Costa Werlang, 1992). The market may continue to record the negative AbnVolume for multiple days after the incident depending on the repercussions of the incident. we employ 31 trading day window for this analysis, i.e. 15 trading days prior to the incident, 15 trading days after the incident, and the trading day itself (if applicable) (Campbell et al., 1997; Kothari and Warner, 2007; Tamburino et al., 2011). If the terrorist incident occurred after the closing of the market, the said trading session will be regarded as the previous day and, accordingly, the analysis window will be of 30 trading days (Baker and Wurgler, 2007; Lamoureux and Lastrapes, 1990). For parsimony, this analysis is limited to 4 major terrorist attacks mentioned in Table 2; a significant reduction in trading volume on the days immediately after the incident is expected.

Table 2: List of terrorist incidents selected for event study analysis

S. No.	GTD ID	Date	Event name
1	200712270001	27 December, 2007	Benazir Bhutto assassination
2	200808210006	21 August 2008	The terrorist attack on Pakistan ordinance factory
3	201309220001	22 September 2013	The terrorist attack on all saints church
4	201412160002	16 December 2014	Carnage at army public school

5. RESULT AND DISCUSSION

This section presents results and analysis concerning the impact of terrorist attacks on the investors' sentiments in the stock market. Particularly, we see how the investor's sentiments (as measured by the trading volume) is affected by major terrorist incidents selected for analysis in this study. We consider four main terrorist attacks and its influence on investors sentiment which include: (1) Benazir's assassination, (2) Pakistan ordinance factory, (3) All saints church Peshawar, (4) Army public school incident

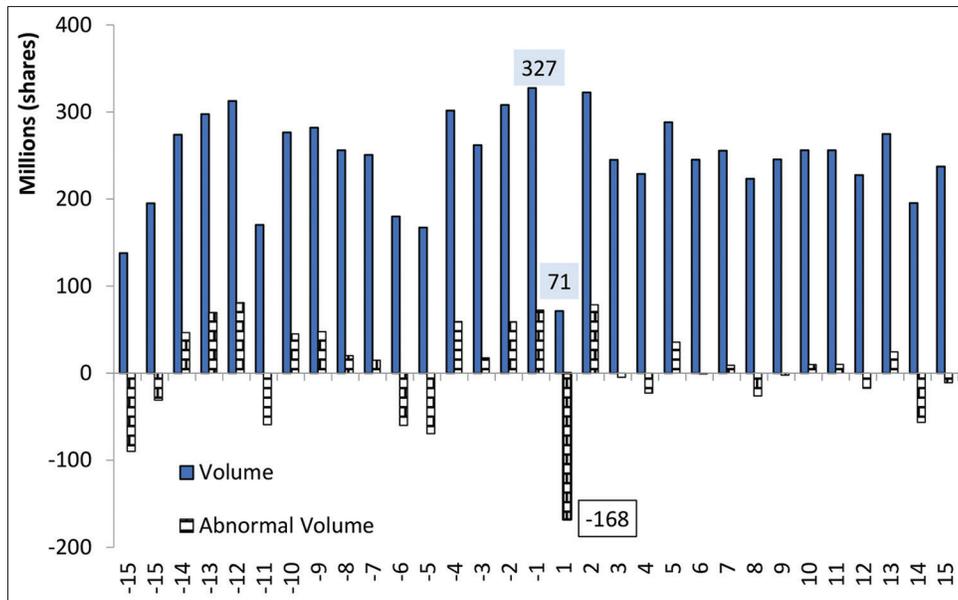
5.1. Benazir's Assassination

The assassination of Benazir Bhutto was, as mentioned earlier, was a high-profile terrorist incident which put the country in a state of turmoil and the upcoming general elections in the country were delayed. The incident triggered violent protests in the country and a wave of uncertainty blew across the economy and the capital market. The incident occurred on Thursday night. Fearing the violent market response, the regulators ordered the closure of the market on Friday. The market opened on Monday. Thus, Monday was the first trading day after the incident which was 3 days after the incident. Had it been a minor incident the market would have operated normally on the said trading day. However, as expected, the investors' sentiments and confidence were badly affected by the incident. The following graph presents the pattern of investors' trading activity around the assassination of Benazir Bhutto.

The dark filled bars in the above Figure 2 presents the trading volume (total number of shares traded) on a given day. Where -15 point on the X-axis presents the 15th trading day before the incident and the point 15 presents the 15th trading day after the incident. The incident day 0 is missing from the graph as the incident occurred after the closing of the stock market. The brick-pattern bars in the Figure 2 present the magnitude and direction of abnormal volume on a given trading day during our window of analysis. The abnormal volume is the 30-trading day mean adjusted, i.e., the volume of the day minus the mean volume of previous 30 trading days.

As labelled in the figure above, the trading volume on the day prior to the incident is 327 million (shares) which plunge to the level of 71 on the first trading day after the incident. The fall in volume is extreme, i.e., nose-dive of more than 78%. This reveals the level of uncertainty and fear in the market even as the trading was started 3 days after the incident. This is in accordance with our expectations and provides empirical backing to our hypothesis

Figure 2: Benazir Bhutto’s assassination (trade volume analysis)



that terrorist incidents adversely affect the investors’ sentiments and confidence in the stock market.

The abnormal trading volume on the first trading day after the incident provides further and more sophisticated evidence. The abnormal trading volume on the first trading day after the incident is, as expected, negative and extreme with reference to other days’ abnormal returns as shown in the figure above. The observed volume (71 million shares) was 168 million lower than the 30-day average of the trading volume. The magnitude of the abnormal volume is more than double that of the actual volume after the 1st day’s trading.

Overall, the investors’ trading behaviours around the assassination of Benazir Bhutto, as presented in the figure, provides support to our proposition and lead us to conclude that the said terrorist incident significantly adversely affected the investors’ sentiments in the stock market.

5.2. Pakistan Ordnance Factory

Pakistan ordnance factory is an internationally certified arm producing Factory located in Wah Cantt, a city of Punjab province near Islamabad which is the capital of Pakistan. It operates under Defense ministry of Pakistan which is considered a safe institution in the country. On Thursday August 21, 2008, two Tehrik-e-Taliban Pakistan suicide bombers attacked on the weapons manufacturing complex. The attack killed 62 people and injured over 100 more. The GTD records that the attack was in response to the military operation in Bajaur that has been attacking Taliban militants. A third bomber was detained near the ordnance factory. That accident brings uncertainty among peoples and the reason investors roll up their businesses.

Figure 3 shows 30 days trading volume of stock exchanges where on Y-axis represent trading in shares in millions and the X-axis represents the timeline. A day before the ordnance factory incident, the total business was 120 million which was ever highest

of 30 days. The day after the accident, the volume was dropped down 113 million shares and the trading volume continues to decline in the following days. That accident created uncertainty among the investors which led to consistently negative abnormal trading volume. After the accident, the investors refrained in last 10 days that’s why the trading volume spilt up to 55 million on the 5th day after the accident. As a result of instability in the market, the volume was dropped down to mere 8 million on the 7th day after suicide and upshot the abnormal volume 91 million which was half of the 211 million shares that were recorded 2 days before the incident. We captured the abnormal trading scenario after the accident, the abnormal volume of 52 million similar to normal volumes of 55 million trade. This abnormal trading behaviour shows that suicide attack had a negative impact on the stock exchange.

5.3. All Saints Church Peshawar

Figure 4 presents 30 days trading volume of the stock exchange where 181 million shares recorded before all saint church’s incident. However, the very next day volumes dropped to 65 million shares, which were one-third of 181 million. Before the accident, the businesses were happy with the normal conditions, but this quickly changed after the event; the investors were carefully trading and rolling up their businesses resulting in negative shocks to the trading market. The total abnormal volume 77 million was recorded after suicide attacked which was one half of business pre-attacked. The market was abnormal in later days and abnormal volume was reached 81 million and the total volume was 44 million which almost half of the abnormal volume. That accident brought uncertainty among the investors which cause an adverse effect on the stock exchange and the abnormal volume was seen.

5.4. Army Public School Incident

Figure 5 shows the trading volume of the stock exchange of 15 days before and post-accident of the army public school. That was extreme assault by terrorists of the era in Pakistan because

Figure 3: Pakistan ordinance factory incident (trade volume analysis)

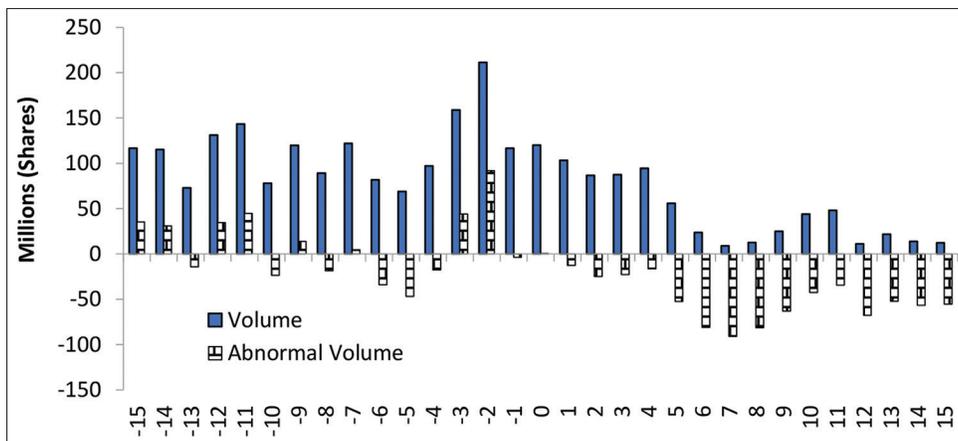


Figure 4: All saints' church incident (trade volume analysis)

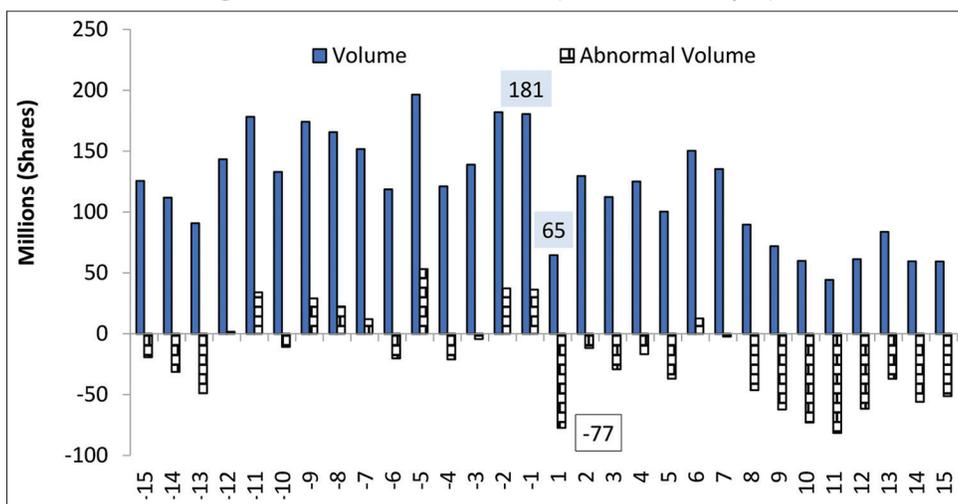
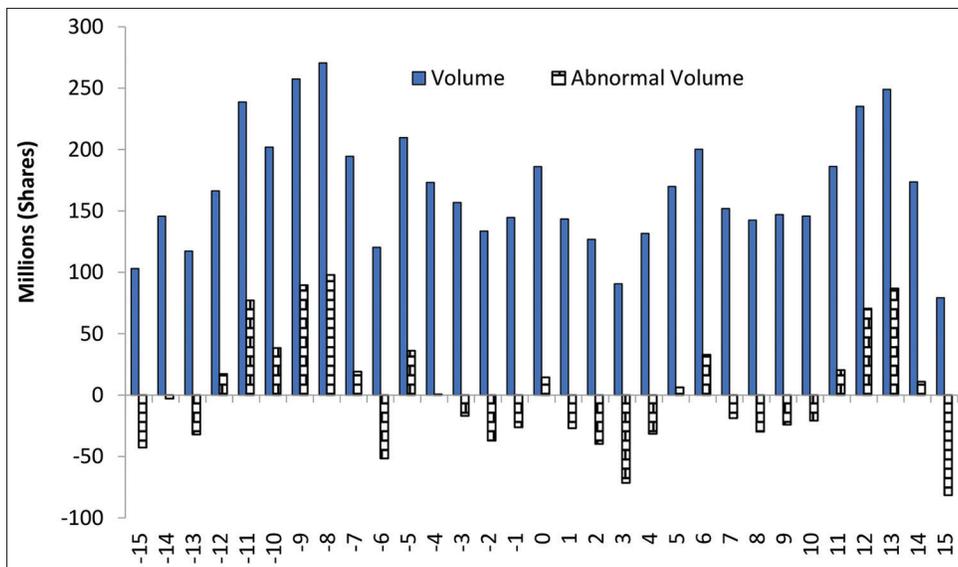


Figure 5: Army public school incident (trade volume analysis)



majority school kids were martyred and most of them were under the age of 15. Due to that accident, people were shocked and feel unsecured in the country and the reason peoples postponed their daily activities. The total volume business was 270 million shares

before 9 days of attack which is ever highest spike of the month. In later days the trade volume was dropped down to 144 million shares before 2 days ago which was 46% of the 270 million. The total business 180 million were recorded on accident day but the

Table 3: Terrorist incidents abnormal volume

No. Days	Benazir Bhutto assassination		Pakistan ordinance factory		All saints' church		Army public school attack	
	Volume	Abnormal Volume	Volume	Abnormal Volume	Volume	Abnormal Volume	Volume	Abnormal Volume
-5	167.1	-69.6	69.0	-46.8	196.4	53.1	209.7	36.1
-4	301.6	59.1	97.2	-17.5	121.1	-21.2	173.2	0.6
-3	262.0	17.5	158.9	44.2	138.9	-4.4	156.8	-16.9
-2	308.1	59.0	211.2	91.9	182.1	37.3	133.6	-37.1
-1	327.4	72.2	116.6	-3.8	180.5	36.2	144.7	-26.3
0			120.2	0.5			186.1	14.4
1	71.3	-168.1	103.4	-12.6	64.6	-77.3	143.5	-26.9
2	322.5	78.5	86.6	-24.9	129.6	-11.7	126.8	-39.7
3	245.1	-4.9	87.5	-22.8	112.4	-29.2	90.7	-71.4
4	228.8	-23.1	94.4	-16.5	125.1	-16.8	131.7	-31.6
5	288.1	35.5	55.8	-52.3	100.3	-36.9	169.8	6.3

This table presents the KSE 100 index trading volume and 30-day mean adjusted abnormal volume in days surrounding four terrorist incidents selected for analysis

investors were conscious in the next day's that's why trade volume dropped down 90 million shares on the 3rd day of the attack. As result, the stock exchange was in a recession state and abnormal trading 71 million was recorded post-terrorist activity.

The Table 3 summarizes the trading volume in days surrounding four terrorist incidents. It is notable that the abnormal trading volume on the 1st day after the terrorist incident is negative for all four incidents. In case of Benazir Bhutto's assassination, the effects seem concentrated on the first trading day after the incident but in other three cases, the effects appear to spread over multiple trading days after the incident. However, it is notable in the table below as well as in the graphs described above that the terrorist incidents have significant adverse effects on investors' sentiments which manifested in the form of negative abnormal volume in days after the incidents. Thus, we conclude that major terrorist acts adversely affect investors sentiments and market confidence in Pakistan.

6. CONCLUSIONS

This empirical analysis explored the psychological impact of terrorism for investors in Pakistan stock market, apart from a direct economic loss. Investigations were done for the effects on investors' sentiment and confidence. Major terrorist incidents create/exacerbate uncertainty and fear in the market. The investors are likely to over-respond to such incidents and once the dust settles, the market tend to recover. However, only a portion of the total response is likely to revert, which is due to investors' sentiments. The economic loss caused by these acts is likely to persist. Therefore, the proposed hypothesis argues that terrorism adversely affects investors' sentiments across the market. The reversion of CAR soon after the adverse shock of terrorism is experienced by the market provides support for our hypothesis. For more robust evidence, the market trading volume for days immediately after the terrorist incidents was assessed. The volume analysis provides strong evidence that the terrorist incidents adversely affect investors' sentiments and confidence in the market as manifested through their relatively feeble trading behaviour.

Overall, this study concludes that the magnitude of terrorism adversely affects the stock market returns in Pakistan. Despite the

fact that terrorist incidents occurred commonly, the stock market is not non-responsive to additional terrorist incidents. Also, the adverse effects of terrorism are felt indiscriminately across all sectors of the economy. Apart from a direct economic loss, the terrorist incidents also adversely affect the investors' sentiments and exacerbate future uncertainty.

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