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**THE ECONOMIC COST OF TERRORISM AND NATURAL
DISASTERS: A DEEPER ANALYSIS OF THE FINANCIAL
MARKETS OF PAKISTAN**

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ABSTRACT

Do natural disasters and terrorism affect the financial markets of Pakistan? We aimed to answer this question by studying a large dataset of stock returns of financial markets of Pakistan with respect to natural disasters and terrorist activities. The dataset consists of a total of 289 terrorist events and 45 natural disasters; taken from the Global Terrorism Database (GTD) and Emergency Database (EM-DAT), covering events from the year 2003 to 2017. The event study methodology used to analyze daily, weekly and monthly stock returns of concerned sectors. Calculated the Abnormal returns with the help of market adjusted return model. The findings show that terrorist events have statistically significant negative impact on banking sector returns as well as insurance sector returns. Furthermore the impact on Pakistan Stock Market is insignificant. The impact of natural disasters on stock markets was not significant however when studied separately the floods have negative significant impact on bank returns while insignificant for insurance and stock market returns. On the other hand earthquakes are negatively affecting the stock market but no impact has been reported significant neither for insurance nor for banks returns.

Keywords: *Terrorism, Natural Disasters, Stock Market, Financial Sectors, Event Study Methodology, Market Adjusted Returns Model*

1) INTRODUCTION

This paper examines the impact of two major types of events that significantly affect the world's financial markets; natural disasters and terrorism. The latter of these has dominated in discussions more so since the September 11 attack on the USA.

Firstly provide a brief background into the area under study before define terrorism and natural disasters in terms of their use within this study and then similarly discuss the role of stock markets, the banking sector and that of insurance companies within the scope of this paper. Following this we present a comprehensive literature review which covers previous research in this area and subsequently the gap in the literature is identified. Next we discuss in depth the methodology, adopted followed by the results section and conclusion. Finally some limitations and future directions for study are identified, followed by references.

1.1 BACKGROUND OF THE STUDY

Many studies have been conducted around the globe on the consequences of terrorism and natural disasters. The studies review the impact of these events on a range of factors from stock prices to tourism. For example, (Drakos, 2004) studied airline stocks listed at various international stock markets, paying particular attention to the effects of terrorist attacks on tourist visits in three Mediterranean Countries. The results showed a significant negative impact on stock prices. (Cagle, 1996) investigated a significant sample of insurer's stocks affected by damage claims, using the OLS regression model and concluded a negative reaction in stock price for those insurers who had greater exposure to damage claims. In the area of tourism, (Bonham; Edmonds & Mak 2006)

verified the negative impact of terrorism due to tight regulations for Visa issuance on tourism by using Vector Error Correction Model (VECM) for USA & Hawaii.

Further studies on natural disasters and their impact on insurance include a study by Born and (Viscusi, 2006), in which they have indicated the negative influence of natural disasters on insurance companies stock. The authors have focused on the effect of natural disasters on loss ratios, the losses incurred and premiums earned by the insurer. The findings confirm that insurers do suffer losses as a result of natural disasters and number of claims more in disaster year. (Gangopadhyaya, Haley & Zhang, 2010) have assessed the hurricane impact on share price and market efficiency for Colombia, Liberia, Nicaragua, Guyana and Gabon by using the Market model regression. Similarly, (Ding, 2013) tested the abnormality of stock return of US by using CAPM technique due to natural hurricane for U.S.

In terms of previous studies related to Pakistan, (Gul, Khan, Saif, Rehman & Roohullah 2013) analyzed the impact of political events on stock prices of KSE 100 index of Pakistan, covering the 2007-2010 study periods which showed the significant negative impact on stock returns due to political events. Furthermore, (Gul, Hussain, Bangash & Khattak 2010) reviewed the influence of terrorist event of 9/11 on stock markets KSE 100 index, FOREX, interbank markets of Pakistan showing the negative impact on financial institutions and Pakistan's economy.

1.1.1 Natural Disasters

Natural disasters, whether they are earthquakes, hurricanes or floods cause significant personal and environmental damage.

(I) History of Natural Disasters in Pakistan

It has been noted that the occurrence of natural disasters in Pakistan has considerably increased from the 20th century to the 21st century. One of the most historically recognized natural disaster occurring in Pakistan was the 1972 flood, affecting a devastating five million people. The 2010 flood swept one fourth of the country affecting more than ten million people.

Regardless of the type of damage that results, some sort of damage claims usually follow the event. The net effect of the damage claims and the premium increase may be examined through insurers' stock price performance following a natural disaster. Regardless of which effect dominates, the stock prices of insurers exposed to damage claims from the natural disaster should be adversely affected relative to unexposed insurers. (Gangopadhyay, Haley & Zhang 2010) attempted to explain the loss due to effect of natural disasters on share prices of insurer's in two ways i.e. the ability of insurers to handle loss claims will be uncertain as well as the demand for insurance claim will rise which will cause an increase in the rates of insurance. The study concluded that natural disasters have a significant effect on the share price of the insurer.

Natural disasters have an adverse impact on vital financial institutions Pakistan Stock Market for channelizing funds, Banking sectors returns, and Insurance companies' insurance premium claims in Pakistan. Natural disasters enlarge the human sufferings and damages economy critically such as in the case of the 8th October 2005 earthquake and 2010 flood, which caused many deaths and destroyed the infrastructure in Pakistan.

(II) The Present Situation of Natural Disasters in Pakistan

Natural disasters in any country significantly affect the country's economy. The growth of Pakistan's economy in 2006-2007 was almost 6% annually, whereas now it is only at 3%. The recent 2010 flood has had a severe adverse effect on Pakistan's agricultural sector which is the back-bone of Pakistan; as more than 60% of Pakistan's population is dependent on this sector.

Recent natural disasters have had such devastating impacts that have caused Pakistan to utilize its developmental funds for reconstructing the areas that have been destroyed by the natural disasters. As a result Pakistan is unable to meet its targets for future development.

1.1.2 Terrorism

The most adverse factor affecting the economy is "Terrorism" which is defined as extreme violence and destruction resulting due to weak political control and economic pressure.

(I) History of Terrorism in Pakistan

Historically, Pakistan was not in the limelight for terrorism as much as it is at present. In addition, the trends and types of attacks have changed too. For example, the suicide attack was only witnessed once prior to the September 11 terrorist incident. After this there have been more than 387 suicide attacks causing almost 6,000 deaths.

The graph below shows the number of terrorist incidents on average that have occurred between 1999 and 2013. The graph also shows the 5 year averages of the

number of fatalities and injuries. The number of incidents and therefore the number of associated fatalities and injuries have continued to increase over the years. The lowest number of incidents occurred between 1999 and 2003, whilst the highest number occurred between 2009 and 2013, with the incidents increasing almost 20 fold from 1999. to 2015.

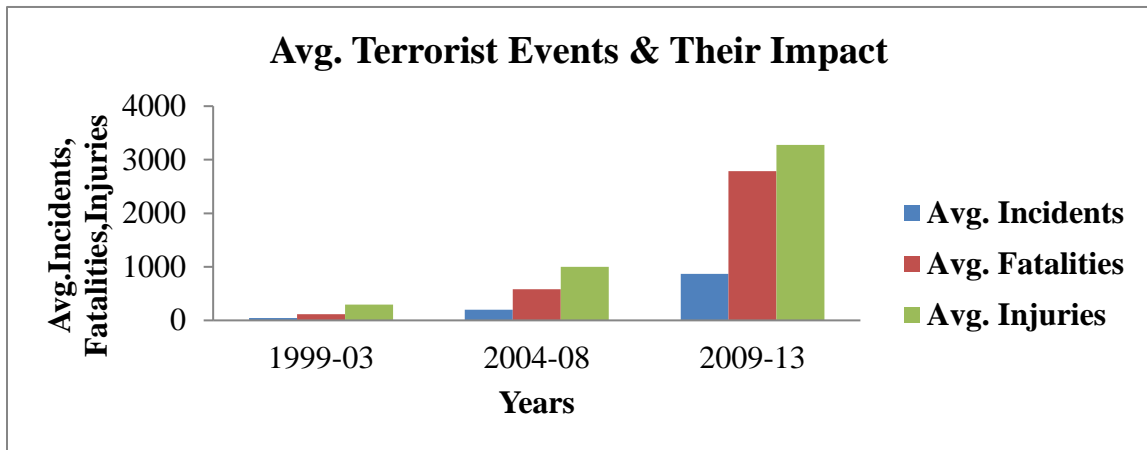


Figure 1: Average Terrorist Events & Their Impact

In Pakistan, terrorism began after the support of “Soviet War” in Afghanistan and the 9/11 event of US. Pakistan faced a huge humanitarian and economical loss due to terrorist attacks for more than a decade from 2000-2017.

Furthermore, the period from 2007 to 2010 has been highlighted as a significant time of terror in Pakistan; amongst other several incidents, one of the major activities affecting the stability and infrastructure of Pakistan was the assassinations of well-known leaders such as Benazir Bhutto and Nawab Akbar Bugti (Gul et al. 2013).

Although a number of previous studies exist on the general topic of terrorism and its adverse consequences, little research has been carried out on the impact of terrorist

events on the stock market. Ultimately, a better understanding of the nature of terrorism and the magnitude of its economic impact is a prerequisite for designing successful policies to prevent terror, to alleviate the costs of terrorism, or to reduce an economy's vulnerability to attacks (Suleman, 2012). Some examples of studies that have covered this area include (Fernandez ,2006) in which the long term impact of the US declaration of war on terror on the volatility of the stock market around the world has been analyzed.

(II) The Present Situation of Terrorism in Pakistan

The present situation in terms of terrorism incidents in Pakistan is certainly not favorable. As discussed previously, the number of incidents has historically increased with the present situation being the worst in terms of number of incidents and the associated fatalities and injuries. According to the *South Asia Terrorism Portal (SATP)*, in January 2014 alone, terrorist incidents caused 460 fatalities. Furthermore, at least five suicide attacks have already been executed in 2014, resulting in 28 deaths and injuring a further 71. Not only the number of incidents is rising but also the severity of the incidents is clearly much worse. For example in 2012, 39 attacks resulted in 365 deaths (an average of 9.3 deaths per incident), whereas in 2013, 43 attacks caused an alarming 751 deaths (an average of 17.4 deaths per incident), almost double the figures from 2012.

1.1.3 Stock Markets

The concept of stock markets was developed in Europe after the industrial revolution when an increasing number of industries acknowledged the importance of high capital provision; in this way the stock exchange market was developed. Financial Institutions within the Pakistan stock markets have been established in the form of Karachi Stock Exchange (KSE) having 100 Index in Pakistan in 1991. Stock markets are

vital for a number of factors including economical growth, market capitalization, interest rate, foreign exchange reserve (FEXRES), foreign exchange rate (FEXR) and foreign direct investment (FDI).

Financial markets are significantly affected by terrorist activities; their effects are directly and indirectly. They can affect the financial markets in the both ways. For example, the 9/11 attacks on the US had indirect effects on markets all over the world, including Pakistan. Stock markets in particular reflect volatile behavior as a result of such incidents; a significant level of fluctuation in stock prices is observed (Gul et al. 2013).

1.1.4 Banking Sector

The banking sector also has its vast authentic history and a number of different phases of evolution exist within the system. In Pakistan the “State Bank of Pakistan” was established on the 1st of July 1948 by its founder Mohammad Ali Jinnah (Quaid-e-Azam), thus the banking system started in Pakistan. Banking institutions play an essential role in the economy through a number of functions. For examples they finance agriculture, industrial and business sectors as well as individuals for lending and borrowing. Furthermore, they also facilitate as production processes and foreign trade e.g. Letter of Credit.

Events such as natural disasters and terrorism place significant pressure on banking and credit institutions due to increased activity such as withdrawals of money, deferral of loan repayments and increased credit applications which are made to finance uninsured rehabilitation costs and disruptions in income flows. In extreme cases, the result may be the collapse of part of the banking sector (Benson and Clay, 2003).

1.1.5 Insurance Companies

At present, industries use insurance to eliminate the risk factor in cargo, death in accidents, goods lost by fire or theft and medical treatments etc, by providing insurance claims. In Pakistan insurance companies were organized under the insurance ordinance of 2000. The insurance sector is recognized highly in Pakistan as it is highly profitable and has a successful growth rate. For the same reasons, the insurance sector as well as the banking sector is seen to be more susceptible to negative effects of terrorism and natural disasters (Chesneya, Reshetarb & Karamana, 2010).

Insurance and insurance stocks are greatly affected by terrorism and natural disasters, this may explain why there is vast research in this area. Several researchers have investigated this area in different respects, for example (Born & Viscusi, 2006) present a detailed review of how homeowners' insurance was affected by the various natural disasters, focusing on the effect of natural disasters on loss ratios, the losses incurred and premiums earned by the insurer. Another more recent example is that of (Iatridis, 2011) who has effectively discussed the impact of three major terrorist attacks on banking insurance and the leisure sector in the UK.

1.1.6 Macroeconomic & Socioeconomic Factors

There are a number of factors affecting terrorism in Pakistan; these can be divided into Macroeconomic and Socioeconomic factors. Each of these has been discussed in further detail below:

(I) Macroeconomic Factors

Macroeconomic factors cover economical growth which is measured using Gross Domestic Product (GDP) and Foreign Direct Investment (FDI). The GDP of any country reflects the market value of all goods and services offered by a country in a given period of time. The growth rate of GDP therefore shows the rate of change that a country's GDP experiences from one year to another. While FDI represents the inflows of foreign investment in the country.

The GDP and FDI are important indicators of the status of a country's overall economy; a strong economy will lead to an increase in wages, investment and low levels of unemployment. The GDP and FDI also affect the stock markets, whether these two factors increases or decreases, the impact on the stock market is usually quite significant.

(a) Growth Rate of Pakistan's GDP

Pakistan's GDP growth rate, at 3.6 percent is currently the lowest in South Asia. The graph below show the fluctuations in the GDP growth rate from 2000 to 2017.

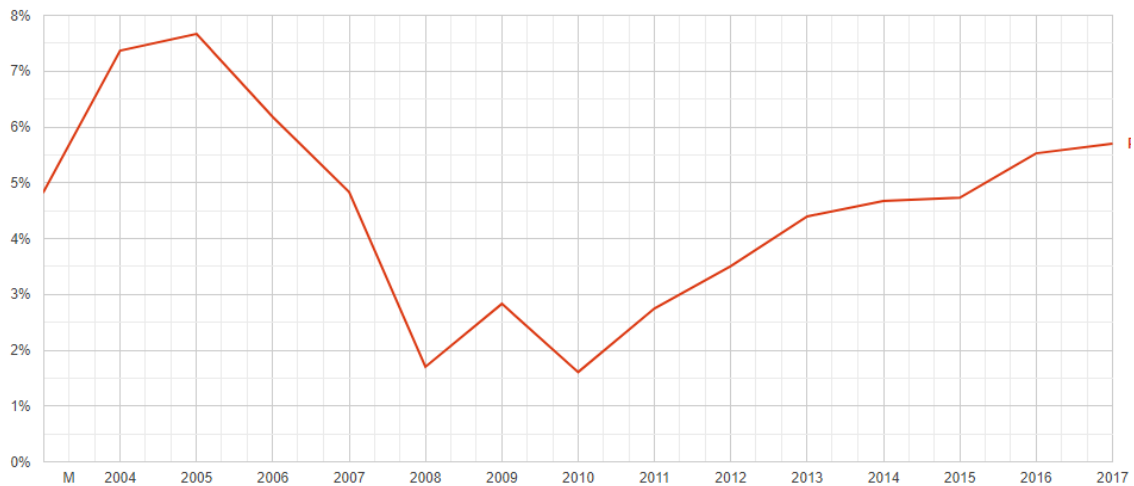


Figure 2: GDP Growth Rate Statistics

The graph shows that Pakistan had the highest growth rate of GDP in 2005 at almost 8%. The lowest growth rate of GDP was experienced in 2010 at 1.98%. The growth rate at 1.98% reflects the economic & political instability of the country.

(b) Foreign Direct Investment (FDI)

FDI rate is currently low in Pakistan due to the increase in terrorist activities. The graph below show the fluctuations in FDI rate from 2001 to 2017. The graph below shows that Pakistan had the highest FDI rate in 2007 and 2008 at 3.6% and 3.32% respectively. However since 2009 the lowest FDI rate is observed in 2012 at a rate of 0.5%. This shows that the FDI have decreased in 2009 and creep up in 2014 at a rate of under 1.0% then again plunged and move up in 2016 and ended up at the rate of almost 1.0% .

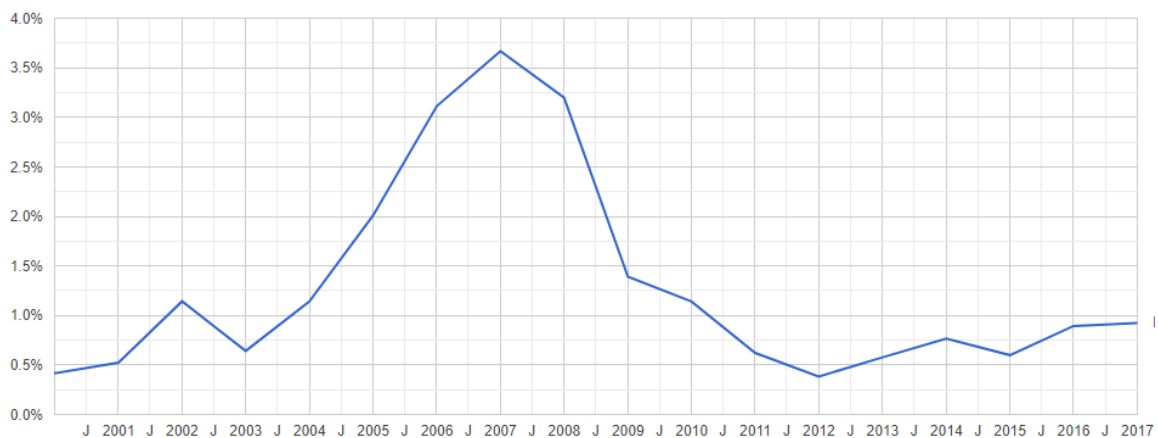


Figure 3: Foreign Direct Investment Statistics

(II) Socioeconomic Factors

These mainly include poverty, illiteracy and unemployment. Although we discuss these factors independently, they are closely related and one certainly affects another. For example, illiteracy results in unemployment which consequently causes poverty. While the case is not always so black and white, unfortunately this is the situation in the majority of Pakistan.

(a) Poverty

It is common knowledge that the majority of people living in Pakistan are victims of poverty and the majority of these are living below the poverty line. Whilst each individual deals with their circumstances in their own way, some people are driven to extremes ranging from committing suicide to harming others. Some are vulnerable and becomes victims of those who recruit such people for their terrorist groups.

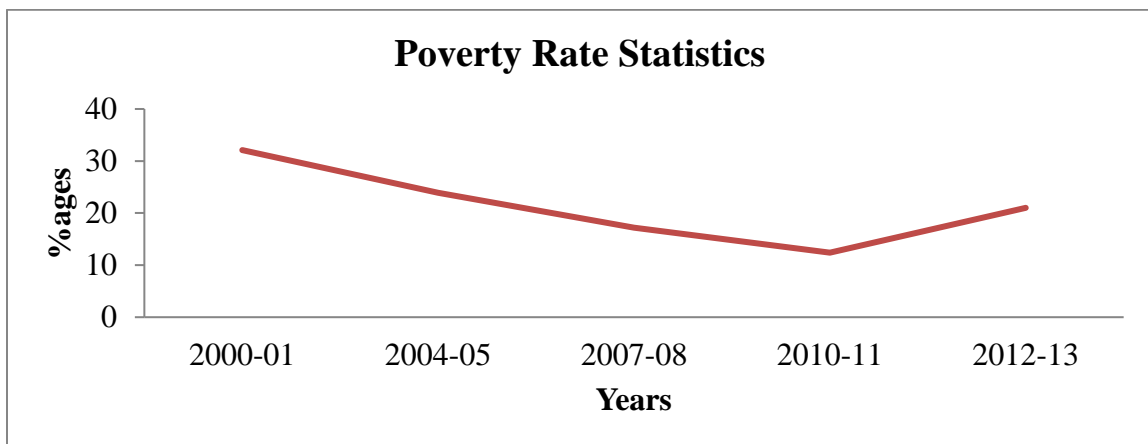


Figure 4: Poverty Rate Statistics

In terms of statistics, Figure 5 shows that between 2000 and 2010 the percentage poverty rate was falling however since 2010 the percentage has been rising again. This

could be attributed to the recent natural disasters and terrorist attacks which have severed the country's economy and hindered development.

(b) Illiteracy

Illiteracy has been identified as one of the major roots causes of extremism and terrorism, both directly and indirectly. It is said that more than 1 in 5 men, between the ages of 15 to 24 are unable to read or write. In addition, only 1 in 20 is able to afford tertiary education. This highlights the extremely high illiteracy rates in Pakistan which has ultimately made the country vulnerable to terrorism. Certain areas of the country are more affected than others, for example in Baluchistan, Khyber Pukhtunkhwa and other tribal areas there is a severe lack of basic literacy and skills. Once again, these are the type of people who are easily recruited by terrorist groups offering monetary payments in return of their services.

(c) Unemployment

Unemployment is amongst one of the most serious social as well as economic issues faced by Pakistan. Although part of the problem can be attributed to the high illiteracy rates, the situation continues to persist despite qualifications. It is a common fact that one person out of ten is unemployed in Pakistan. Besides the obvious problems resulting from unemployment, one of the deeper concerns for the country is that the high population of unemployed people is not only a burden to the society but is the most susceptible to crimes.

Figure 6 shows unemployment rate statistics. It can be seen that the present level of unemployment (2017 data) is the highest since 2000, at a rate of 9.23%. The lowest

unemployment rates since 2000 were observed in 2008 at a rate of 5.202%. This shows that the unemployment rates have increased since 2014.

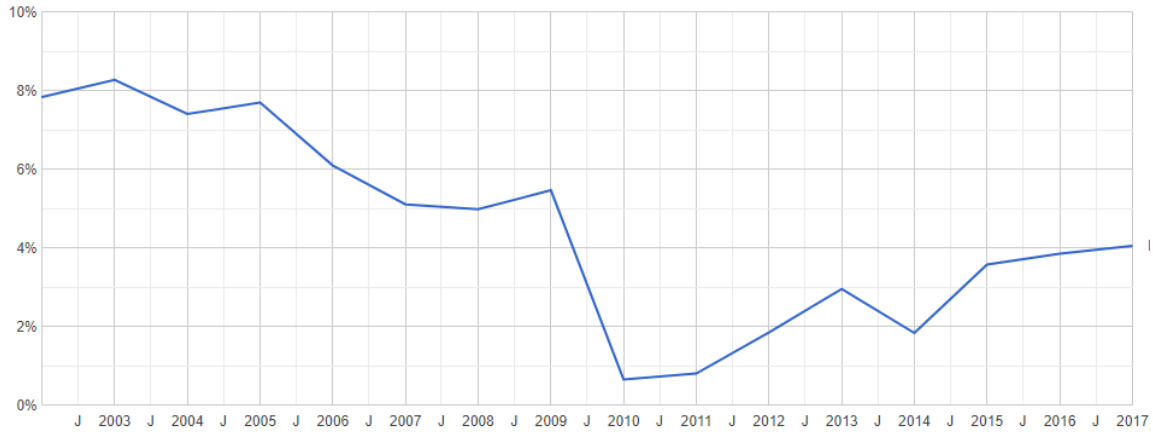


Figure 5: Unemployment Rate Statistics

1.2 PROBLEM STATEMENT

Incidents such as natural disasters and terrorism activities cause a certain level of instability in the financial status of the country affected. It is already established that these type of events result in variable outcomes for the stock markets, however the direction and depth of outcomes is not always defined. This study therefore, will assess the magnitude of the impact of natural disasters and terrorism on financial markets in Pakistan.

1.3 OBJECTIVES OF THE STUDY

There are two major objectives of the study and these have further been broken down in the subsequent sections to generate the Research Questions. The objectives of this study are as follows:

- To examine the impact of natural disasters (further defined in Section 1.1.1) on financial institutions (stock market, banking sector and insurance companies) in Pakistan.
- To examine the impact of terrorism (further defined in Section 1.1.2) on financial institutions (stock market, banking sector and insurance companies) in Pakistan.

1.4 RESEARCH QUESTIONS

This section assigned to Research Questions serves two main purposes; firstly it defines where and what kind of Research is to be carried out and secondly it further defines the objectives of the study. In light of the above Objectives of the Study, the following Research Questions have been generated:

1. Do natural disasters in Pakistan affect the stock returns, banking returns and insurance claims? If so, is the affect significant or insignificant?
2. Does terrorism in Pakistan affect the stock returns, banking returns and insurance claims? If so, is the affect significant or insignificant?

1.5 CONTRIBUTION OF THE STUDY

This study will contribute to research in this field, which will assist financial institutions to make informed decisions concerning investments. As well as providing useful information to financial institutions, this research can also prove useful to government organizations by assisting with the development of guidelines on actions to prevent the effects of terrorism and natural disasters from escalating. A better understanding of the economic impact of terrorism and natural disasters is essential for

producing such guidelines if they are to be successful in terms of reducing associated financial costs and effects on the stock market.

2) LITERATURE REVIEW

This literature review explores the themes underlying the two research questions and further investigates the aforementioned problem statement. The literature review has therefore been divided into three main sections according to the area of research. The first concerns research related to the impact of natural disasters, the second covers the impact of terrorism whilst the final section takes a closer look at the impact of both of these events in Pakistan alone. Whilst the focus of this paper is on events in Pakistan, the scope of this literature review is expanded to include research that examines the impacts of terrorist events and natural disasters on a global basis. This has been done in order to obtain an overview of the research, which is then narrowed down to focus on events in Pakistan. Finally, the research is concluded and a literature gap has been identified.

2.1 IMPACT OF NATURAL DISASTERS

In this section we chronologically review several studies on the impact of natural disasters across the globe. The research included in this section ranges from 2000 to 2017. Each individual piece of research has been carefully reviewed and a synopsis of the research area, method of analysis and main findings has been presented. Where possible, a critical analysis has also been carried out, whereby recommendations have been proposed for future studies.

(Angbazo & Narayanan, 1996) aimed to check two opposite impacts of natural disasters on insurance firm i.e. negative impact on claim of policy holders on payments

and positive impact on high premium expectations. The strength of these two impacts has examined by using GLS (Generalized Least Square) & Modified event study methodology which has on a sample of 48 publicly traded insurers' stock prices from (Aug, 1992 to Sep, 1992) in order to check the effect of Hurricane Andrew. The authors concluded that Andrew not only resulted in contamination effects which drastically affected many insurers but also left huge harmful effects on insurance stock which was mitigated up to some degree through a slightly positive effect which suggest to market insurers to recover some damages of Hurricane Andrew by the way of increasing consequent premium.

(Cagle, 1996) assessed the effects of Hurricane Hugo on Insurance Stock prices which reflect the net effect of the premium increase and damage claims. The author acknowledges that previous studies in this respect revealed that regardless of level of exposure to the hurricane, there was no significant stock price reaction for insurers. This study further evaluates the evidence surrounding the effects of Hurricane Hugo insurer stock prices. The empirical results by using OLS Model on 17 samples of insurer's stocks demonstrated a negative reaction in stock price for those insurers who had greater exposure to damage claims; whereas companies with little exposure remained unaffected. The author concluded that an increase in premiums by the insurers would not fully offset the damage claims resulting from natural disasters.

(Worthington & Valadkhani, 2005) aimed to review the impact of natural disasters on the equity markets in Australia. The authors used a range of data from 1982 to 2002 consisting of accumulation returns and daily price, and have included 42 natural disasters in the study. This study uses intervention analysis in an autoregressive moving average

(ARMA) framework. The results revealed that generally the market returns are majorly affected by natural disasters; the net effects of which may be positive and/or negative, depending on the type of natural disaster.

(Chen, Kim & Kim, 2005) described the relationship between macroeconomic and non-macroeconomic variable and hotel stock return. Consumption-based asset pricing model conducts by using macroeconomic variables. This study brings relationship between macroeconomic variable and hotel stock and non-macroeconomic variable such as political, sport event, natural disaster. It has concluded those non-macro variables are more powerful than macroeconomic variables.

(Born & Viscusi, 2006) present a detailed review that how homeowners' insurance was affected by the various natural disasters. The authors have used a very large dataset covering the period from 1984 to 2004 and applied modeled two interactions "Restrictive Regulation" with the two lagged "Blockbuster Catastrophe" variables. The data has been organized by year, state and firm. The authors have focused on the effect of natural disasters on loss ratios, the losses incurred and premiums earned by the insurer. The findings confirm that insurers do suffer losses as a result of natural disasters, although they adapt to these losses by increasing insurance rates in the years in which no disasters take place.

(Blau, Ness & Wade, 2008) assessed how two major hurricanes impacted the short selling of insurance stocks. Hurricane Katrina (August 2005) and Hurricane Rita (September 2005) both affected the Gulf Coast region of the US. For the purpose of the study, short-sale data and trade data have been used. The total number of stocks used in

the analysis is 72.3 over the sample time period (July 1, 2005, to September 30, 2005). An event study method has been used for analysis; the results showed two main trends; firstly an increase in short selling was observed 2 days after Hurricane Katrina and secondly, short-selling activity was much more prominent after Hurricane Rita.

(Oh & Reuveny, 2010) reviewed the effects of both natural disasters and political risk on international trade. In doing so, the authors have presented a statistical analysis covering some 116 countries from 1985 to 2003. The results confirm that natural disasters pose a negative effect thus reducing trade. For the purpose of analysis the authors took a pair of countries as the unit of analysis and based the model on the trade gravity design. The conclusion suggests that an increase in natural disasters would ultimately lead to a decline in the growth of the global economy.

(Gangopadhyay, Haley & Zhang, 2010) attempted to explain the loss due to effect of natural disasters on share prices of insurer's in two ways i.e. the ability of insurers to handle loss claims will be uncertain as well as the demand for insurance claim will rise which will cause an increase the rates of insurance. This argument was supported by historical data of natural disasters occurred in 2005 i.e. Hurricane Katrina & Rita which effected the share price of insurer significantly. One of them is that Katrina affected negatively while Hurricane Rita has significant positive or negative effects on share prices of insurer's. In conclusion of this study the author's natural disasters has a significant effect on the share price of the insurer's.

(Luo, 2012) attempted to examine the effect of earthquake happened in Japan in 2011 on six worldwide stock markets. The methodology implied consist of event study

methodology in order to assess the stock market reaction by calculating daily abnormal returns (ARs), AARs, CARs and CAARs. By applying statistical T-test the findings reveal that there is small impact of shock on under study stock markets, however the impact was insignificant.

(Thomann, 2012) evaluated the effect of natural disasters & 9/11 attacks on the variations in insurance stocks and to check the correlation between insurance stock & the market. The results confirmed that natural disasters enhance the variations in insurance stock and have ability to condense the correlation between the market & insurance stock. As a result market portfolio strategy is used to minimize the risk of natural disasters. In addition, the author concluded that events just like 9/11 not only amplify the correlation but also enhance the volatility and market risk i.e. beta of the insurance stocks as well.

(Ferstl, Utz & Wimmer, 2012) reviewed an event study based on the effects of natural disasters on daily energy stock prices. The data concern the stock prices of four countries; France, Germany, Japan and U.S. For analysis purposes, multivariate regression models and bootstrapping have jointly adopted by the authors. The consequences confirmed that firm of Japanese, Germany and France earned significant abnormal returns; for the US however, the authors cannot confirm any abnormality in returns.

(Born & Blettner, 2013) identified the basic elements which push insurer's motivation to supply insurance coverage inside catastrophe-prone home insurance policy collections on 500,000 observations. They examined insurer's source selections inside private and also business collections, by having an increased exposure of insurer's reactions inside the production regarding normal catastrophes. The empirical final results have advice the

crucial coverage ramifications to enhance the availability of insurance policy in opposition to devastating dangers. Into the influence regarding corporate restrictions, empirical facts present that one corporate reaction may possibly inadvertently hinder insurer's motivation to offer insurance coverage in opposition to normal catastrophes.

(Ding, 2013) carried out a comprehensive review of the literature on the efficiency of U.S stock market by taking into consideration the 18 hurricanes which smack U.S continents since 2000. By taking a data set of 60 insurance companies the authors analyzed the consequences of those 18 hurricanes on stock market prior and after the hurricanes. By supporting semi strong form of market efficiency the authors concluded that inefficient market exists before the hurricane period. In addition, authors found that there exists a considerable negative relationship between a firm's risk exposure & wind speed which recapitulate the ability of market to distinguish the hurricanes from their damages.

(Belke, 2013) reviewed how natural disasters in Japan affected financial markets as well as national debt across the world. In particular, the effects on macroeconomics after the nuclear accident are observed. To achieve this, the authors assess to what extent Japanese suppliers are involved in international production chains, and how much the world economy is affected as a result. The author's analysis confirms that the spread of the effects of the natural disasters in Japan were prevented and therefore manageable. Long term radioactive contamination, however cannot be accurately predicted.

Wang (2013) attempted to examine the impact of natural disasters on the Japanese stock market. The methodology consists of two models; the GARCH and the GARCH-in-the-mean models. In terms of the data, the author has used the Japanese Nikkei 225 stock

index, the Standard & Poor's-500 stock index, the 10-year bond yield in Japan, and the US Dollar-Japanese Yen exchange rate. The findings reveal that there is only indirect impact of natural disasters on Japanese stock return and no linear impact was found. The authors conclude however, that the indirect effects do not persist due to adjustments made in the stock market soon after the impact.

2.2 IMPACT OF TERRORISM

(Fitz & Gerald, 2003) attempted to detect illegal financial flows related to funding of trans-border terrorism. Qualitative research method used to tell about an illegal financial flow has created lot of problem for the stability of a country. There should be money laundry act which should be strongly implemented. Withholding tax system should be imposed on all kind of inward and outward remittance. Offshore receipts and payment should be strongly monitored. Central bank of every country should play their part.

(Sloboda, 2003) aimed to review the impacts of terrorism on tourism in the USA. In doing so, the author utilized the ARMAX (autoregressive moving average with explanatory variables) model for data sample of (1988-2001) which basically allows for assessment of impacts of the explanatory variables on the dependent variable. This type of model consists of a single-equation approach, which has the ability to provide impact analysis easily. The model however only provides a short-term assessment of terrorist incidents on tourism.

(Chen & Siems, 2004) evaluated the terrorism effects on global capital markets. The incident study methodology is used to inspect the response of US capital market's to 14 military/terrorist attacks dating back to 1915 and two recent incidents- Iraq's invasion of

(Kuwait, 1990) and terrorist attacks of September 11, 2001. The conclusions show the capital market of US is more buoyant than previously and develops more efficiently than any other capital market. It is established that the increase in the market buoyancy may be practically clarified by a steady financial sector that offers acceptable variability to reduce alarm and encourage stability of the market.

(Drakos, 2004) attempted to investigate the effects of September 11 terror attacks on a set of airline stocks listed at various international stock markets. To get most relevant results Market Model was used identified. The results confirmed that for airline stocks a structural break exists in the systematic risk. The empirical findings show that both systematic risk and idiosyncratic risk have increased significantly. In quantitative terms, on average, conditional systematic risk has more than doubled, and the percentage it represents over total risk has shown a considerable increase.

(Eldor & Melnick, 2004) evaluated how foreign and stock exchange markets reacted to terrorism using daily data. The data used differentiates between the location of the attack, the target of the attack, the type of attack, the number of casualties and the number of attacks per day for 639 terror attacks in Israel from 1990 to 2003. The results showed that in total 1212 people were killed and 5726 people were; 'injured. Furthermore, suicide attacks had a permanent effect on both the stock and foreign exchange market, as did the numbers of victims, while location of a terror attack had no effect on either market. The authors concluded that financial markets continued to function efficiently and past market liberalization policies evidently contributed to coping with the terror.

(Brown, Cummins, Lewis & Wei, 2004) reviewed the federal government's role in the market for terrorism reinsurance. The focus is mainly on the effect of 13 events on the stock price of affected industries. These events are a significant contribution in the implementation of "Terrorism Risk Insurance Act (TRIA)" of 2002. The findings demonstrated that for the industries in relation to banking, construction, real estate investment trusts, insurance, transportation and public utilities; the effect of stock price was negative. Furthermore the Act was at best value neutral for property casualty insurers because it eliminated the option by not to offer terrorism insurance. It was concluded that the negative response may be a result of the Act worsening to concentrate on nuclear, biological and chemical hazards.

(Johnston & Nedelescu, 2005) reviewed the response of authorities' to effects of terrorism on financial markets. In addition, regulatory responses to terrorism are also discussed. The author reviewed the impact of the September 11 and March 11 2004 attacks in Madrid on the financial markets by evaluating both the direct and indirect economic consequences of terrorism. The author includes case studies of financial markets which became victim to terrorist attacks. In conclusion, the paper found that minimized, quick liquidity, and vital financial markets were well-organized in gripping the shocks of terrorist activities.

(Worthington, Valadkhani 2005) studied the impact of terrorist, industrial and natural disasters by using the Tiao and Box interference investigation on the Australian capital market. The data reveals daily returns in ten markets sectors i.e., telecommunication, services, consumer staples, energy, industrial, financial, consumer discretionary, I.T, materials, utilities and health care. Autoregressive Moving Average (ARMA) model has

been used to analyze the impact of these events. Thus most significant outcome of this study is that losses due to natural events have an impact on the market returns. The most responsive sectors to disasters are the material sectors, consumer discretionary and financial services. 9/11 is considerable single event in terms of its effects on capital market for the phase of the past eight years.

(Karolyi, 2006) attempted to evaluate the effects of terrorism for financial markets. The author point out that quantitative assessment is much difficult because of the lack of statistical data about risk of terrorism. In this paper latest research techniques are used to check the quantitative impact of terrorism on financial markets in accordance to the event of “Nine Eleven”.

(Rudner, 2006) tried to assemble all the leading points of havoc caused by militant jihadist emphasizing mainly on the funding of such organizations. Focus has been placed on al-Qaeda and its tactics used for spreading the fear. The activities of international terrorist operations includes many steps ranging from terrorist planning to the main objective i.e. assaults on targets. Finance is highlighted as a significant factor in reaching the goal of terrorism; al-Qaeda and its affiliates have been found to be funding such movements. The research covers most of the Islamic countries and the propaganda going on there. The author has used different financial intelligence companies to collect data; these include Fiu, Austrac, Fincen, Tracfin and Fintrac all of which work on disclosing the financial intelligence on unusual transactions to national authorities for interrogation.

Bonham, Edmonds & Mak, 2006) analyzed the impacts of 9/11 terrorist attack & other consequent dreadful International events and the speed of their revival on tourism in U.S

and Hawaii. After analysis authors noted that recovery from the damages occurred due to 9/11 on tourism in U.S is time consuming process while the tourism in Hawaii has increased due to the decreasing trend of tourism towards USA because of strict regulations on VISA processing in U.S embassy. Vector Error Correction Model (VECM) has used to predict number of tourists in Hawaii. This research was made to analyze whether the effect of terrorism was fully recovered by tourism in Hawaii or not and to give suggestions to improve the tourism in U.S.

(Arin, Ciferri & Spagnolo 2007) measured the impact of terrorism on financial market returns by considering “US stock market return as a proxy of global market”. Empirical analysis of six countries is done through causality between stocks and terrorist attacks by using time series data. So Terrorism creates volatility in stock market return. Significance of terrorism on stock varies from country to country due to their policy and regulation towards terrorist activities. To stop the fluctuation in stock market return must reduce the terror of terrorist attack.

(Fernandez, 2008) analyzed in this article that how US declaration war on terror has affected the long term instability of stock market in the world. Wavelet Variance Analysis methodology and (SEMIFARIMA) model is used. It is concluded that initially during (2000-2006) a worldwide instability in stock returns has been experienced. There is no volatile market financial market before this period. Political instability due to Iraq war adversely affects the financial markets. There should be political stability in this region in order to have stable volatile of financial market.

(Drakos, 2010) author indicates the negative reactions of investors after terrorist attack on a sample of 22 countries. World CAPM used to know the terrorist activities impact on the stock return volatility also physiological factor determine. The GTD (global terrorism database) develop auto-regressive Heteroskedasticity. Empirical result shows that the terrorist activity would have impact on daily stock return after terrorist attack. There is need to control terrorist activities to stable the return as well as investor behavior.

(Ahlgren & Antell, 2010) investigate the impact of stock markets, emerging markets and financial crisis testing by applying co-breaking modeling with estimated VAR system. The empirical results shows more co breaking impact on emerging markets and developed markets due to terrorist attacks of 9/11. In short run financial crisis occurred but no contagion seen. Investor should have to adopt some risk diversified investment strategy to avert return from co-breaking or financial crisis.

Meyer (2010) carried out a comprehensive literature review on Financial Markets and Terrorism and then provided a critique of the literature. The research method involved the sorting of 25 Most Influential Papers Meyer (2010) by means of separation according to the research topic. Following this separation, the papers were analyzed in terms of their similarities and differences in the authors' conclusions. The author concludes that financial markets and terrorism are connected in a number of ways; insurance policies and macroeconomic consequences of terrorism are the two dominating areas in question. This research however, remains limited as it was only based on a selection of 25 papers.

(Kollias, Papadamou & Staginess 2011) reviewed 2 major stock exchanges LSE of London and Madrid in Spain facing the worst effects of terrorist attack in form of

declining stock prices. GARCH model is used to know the compound volatilities and comparing with high to low volatility time period. Empirical results shows the quick impact on both stock exchanges but London stock exchange recover soon then Madrid stock because of effective structure and liquidity in market as graphically also shown. The difference is between two countries their policy and rules implication way. But the impact of terrorism cannot live long last.

(Kerjan & Raschky, 2011) focused on US where terrorism risk insurance provides necessary incurred after terrorism. Quasi-maximum likelihood estimator (QMILE) has used on cross section data which concluded that proper insurance policies have compensated people from losses but it can prevent the terrorist attack and also the role of Government remain critical not only to prevent terrorism attack but also to provide necessary support to stabilize terrorism insurance market.

(Gupta & Guidi, 2012) showed the co-integration between the stock markets of India and other Asian developed countries and stock indices volatility over the time duration. To test the hypotheses granger co-integration, granger causality test or many others methodologies and in the last SWARCH Model is applied. Results suggest there is significant impact or correlation in volatility of stock Indian due to terrorist attack and financial crisis thus investor try to diversified its risk to switch investment other Japan & Hong Kong developed stock markets. But the significant factor not remains in long run. Investors attract high to low volatility markets to maintain their investments portfolios.

(Frijns, Indriawan & Tourani, 2012) described the political decline and terrorist attacks impact on integration of emerging market with stock market from 1991-2006 in the shape

volatility of stock prices e.g. equity, oil prices etc. affecting more than 19 emerging markets. In which CAPM model employed by using cross section and time series data of different countries and market volatility measured by Beta. The empirical result shows the impact of political crisis on emerging markets and stock market integration varies reign to reign but negative. So there is need to minimize the political crisis and terrorism to stabilize the stock markets and stock prices.

Institute for Economics and Peace (2012) aimed to summaries changing trends in terrorism over a 10 year period from 2002 to 2011, in 158 countries, using a unique scoring system known as Global Terrorism Index (GTI) which ranks countries according to their terrorist activity. The GTI score was calculated for each country in a given year. Four factors have been used; 1) total number of terrorist incidents, 2) fatalities caused by terrorism, 3) injuries caused by terrorism and 4) the approximate level of total property damage from terrorist incidents in a given year. The report data reveals the fact that terrorism has increased rapidly especially from 2002 to 2011. Out of 158 countries only 31 are lucky enough to not become victim of terrorism. By considering GTD we can find many incidents of injury & a minor property loss.

(Gries & Meierriecks, 2013) investigated the banking sector decline of 146 and less developed countries from 1972-2006 due to increment in terrorist activities. By taking 5 year interval data develop hypothesis and global terrorism database (GTD) through drive model named (negative binomial maximum likelihood estimation model). Empirical results show the increase in terrorism activities as well as increase in banking crisis so here is need to control the terrorism to overcome the banking crisis.

(Hua & Bapna, 2013) reviewed a relatively new concept of cyber terrorism and its impact on economy. The author presents a definition of cyber terrorism as an extension of traditional terrorism and a new approach adopted by terrorists to attack cyberspace. The author reviews the literature on Information Systems (IS) security and assesses the important factors that affect investment in IS security. For the purpose of this study the authors have proposed a general game theoretical model and applied it to compare the losses caused by cyber terrorists and common hackers, thus the model shows the economic impact of cyber terrorism. The results imply that more should be invested by organizations to protect IS's against terrorists who have long-term goals.

(Kollias, Kyrtsov & Papadamou, 2013) investigated the effects of terrorism on the oil price-stock market. Simple BEKK model is used to find the correlation between oil-stock market and terrorist attack. Result shows that war and terrorist attack have return relationship. The oil price-stock market is effect by the war. Government should create a comprehensive plan in order to minimize these kinds of risk. Main broker of stock market should play their part for the betterment of stock market.

(Essaddam & Karagianis, 2014) discussed terrorist activities from country to country as well as stock return changes negatively to the extent of terrorist attack. GARCH model applied and cross sectional analysis conducted to test the volatility but the effect is no longer more than fifteen days by mainly focusing on US stock markets. Empirical evidence expressed more return volatility in democratic country than less democratic country. More research needed to recognize the actual magnitude of volatility because of country, company, democracy, investor behavior and nature of terrorist attack.

2.3 IMPACT OF NATURAL DISASTERS AND TERRORISM IN PAKISTAN

(Gul, Hussain, Bangash & Khattak, 2010) have investigated the effects of different terror attacks such as 9/11 on KSE, FOREX & interbank market. Empirical results drawn from data by using Multiple Regression Model, OLS model and statistical hypothesis develop to describe the impact of terrorism on three most important financial markets of Pakistan. Terrorism significantly negatively affects the financial institution as well as Pakistan's economy. Make better policies regarding strict control of terrorism, increase globalization in order to achieve healthy economy and profitable markets.

(Gul, Khan, Saif, Rehman & Roohullah, 2013) looked at how the share values of the monetary division of Pakistan are affected by the impact of political events, natural calamities and terrorism. The data covers a randomly selected sample of 14 companies from the Insurance and Banking sector and covers the period from 2007 to 2010. The companies are listed on the KSE-100 index. For data analysis paired sampled t-test statistics were used. The findings of the study showed a significant negative impact of the events on stock prices. The authors concluded that a combined effort is required from all stake holders to protect the efficacy of financial markets in Pakistan from the aforesaid events.

(Fiyaz, 2013) described the pattern prevailing in the current consequence of terrorism in Pakistan. Combination of eight trends was used to investigate and analyze conceptually the area of terrorism. Time series analysis has used. Statistical data collected from multiple sources – Institute of Peace Studies (PIPS), second the South Asia Terrorism

Portal (SATP) and third Centre for Systemic Peace (CSP). To avoid terrorism strengthen the democratic system by establishing good governance and take more active actions toward terrorism and terrorist activities to overcome more destruction in the country.

(Jawaid and Raza, 2013) show the influence of terrorism on tourism in Pakistan by using historical data from 1980 to 2010. ARDL developed co-integration method and hypothesis result showing the negative effect of terrorism on tourism in long and also in short run. Rolling window method results also quite similar. Granger causality analysis and Toda, Yamamoto modified Wald test causality analysis and Variance decomposition analysis indicates the causality between terrorism and tourism. Government of Pakistan should take steps to overcome terrorism and generate more national income from tourism.

2.4 CONCLUSION OF LITERATURE

A number of important points can be concluded from the research addressed in the literature review. The most significant of these is that although a vast amount of research exists on the selected topic, the majority of this research is based on events occurring in the USA and other parts of the world. This possibly reflects the popularity of events such as the September 11 terrorist attacks and natural disasters such as Hurricane Katrina. Furthermore it may also reflect the frequency of events occurring suggesting that countries such as the USA are prone to a large number of terrorist attacks and natural disasters relative to other parts of the world.

On the contrary, research related to such events in Pakistan was found to be limited, i.e. a gap exists in the current literature. This could be for two possible reasons; firstly the

number of natural disasters and terrorist events occurring in Pakistan is very small or secondly, knowledge of such events across the globe is not widespread. We explore the validity of these possible reasons through this paper.

2.5 LITERATURE GAP

In terms of contributing to Research, this Study is exclusive in the sense that it is the only research to combine and assess the effects of both natural disasters and terrorism in one single study on Pakistan. Previous studies have concentrated on one area or the other but not combined these in one study. Furthermore, the number of variables in this study is more than the previous studies and impact of these variables is studied over a long period of time.

3) METHODOLOGY

3.1 VARIABLES OF THE STUDY

3.1.1 Independent Variables

There are two dependent variables in this study; Terrorism and Natural Disasters. Terrorism covers all such incidents where violence, terror or threatening behaviors is used to achieve a religious or political aim. For the purpose of the study, terrorist incidents included are not restricted to any specific location. In terms of the second variable, Natural Disasters covers a range of natural events such as earthquakes, hurricanes, fires, floods etc that usually result in heavy loss of life and destruction of the environment. Again, for the purpose of the study the location of the natural disaster has not been restricted.

3.1.2 Dependent Variables

The dependent variable used within this study is Financial Markets. Financial Markets is further broken down into the following three factors; Stock Market, Banking Sector and Insurance. The Karachi Stock Exchange (KSE) 100 Index has been used for the purpose of this study. The Stock Market, Banking Sector and Insurance factors will be measured using stock returns, banking returns and insurance claims respectively.

3.1.3 Theoretical Framework

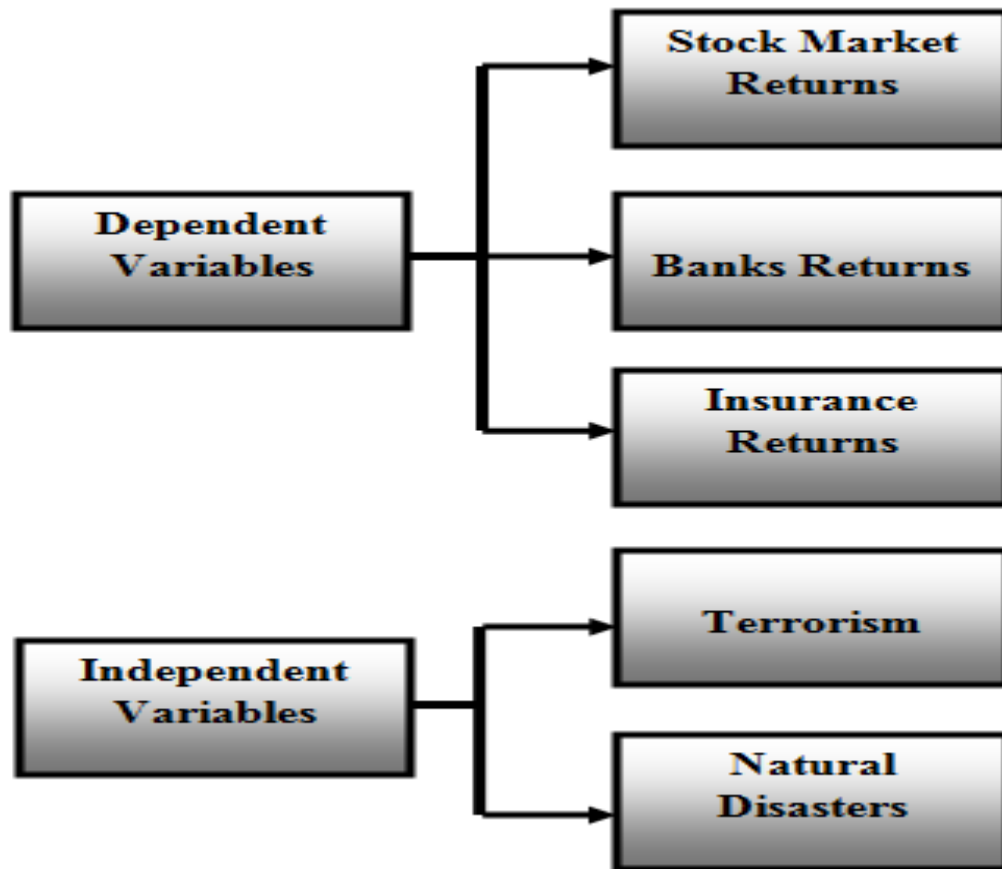


Figure 6: Dependent & Independent variables

3.2 DATA COLLECTION

In this study, data regarding terrorist attacks has been taken from the Global Terrorism Database (GTD) which is maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism (START). The data sample covers terrorist activities during the period 2003 to 2017 in Pakistan.

The initial sample contained 5140 terrorism events occurring in Pakistan; these terrorist events were further filtered by type of event. All bombing/ explosions and assassination events are selected from the sample resulting in a sample size of 500 events. This sample size is further reduced by selecting only those bombings/ explosions in which the number of casualties exceeded 15 and assassinations of dominant political personalities. The final sample size that resulted after this elimination contained 289 terrorist events.

In terms of the data concerning natural disasters, the sample information is extracted from the EM-DAT database and the Dawn Newspaper. The type of natural disasters selected for the sample is limited to earthquakes and floods. The total numbers of events covered are 45, for the same period of 2003 to 2017. Daily, weekly and monthly stock prices of Pakistan Stock Market, banking sector and insurance sector are collected in order to assess the impact of natural disasters and terrorist activities on the financial markets. The stock prices data of Pakistan Stock Market is taken from Yahoo Finance and PSX and stock prices for banking and insurance sectors is taken from Business Recorder for the same time period.

3.2.1 Distribution of Terrorist Attacks

The occurrence of terrorist attacks in Pakistan is widespread; however the frequency is higher in some locations than others. The map/ Figure 8 represent the geographical distribution of the 289 terrorist attacks occurring from the period of 2000 to 2013. The map shows that the attacks are not confined to any particular area and have occurred in Punjab, Sindh, Baluchistan, Khyber Pukhtunkhwa and some other districts. The attacks are most concentrated in Khyber Pukhtunkhwa area of Pakistan.

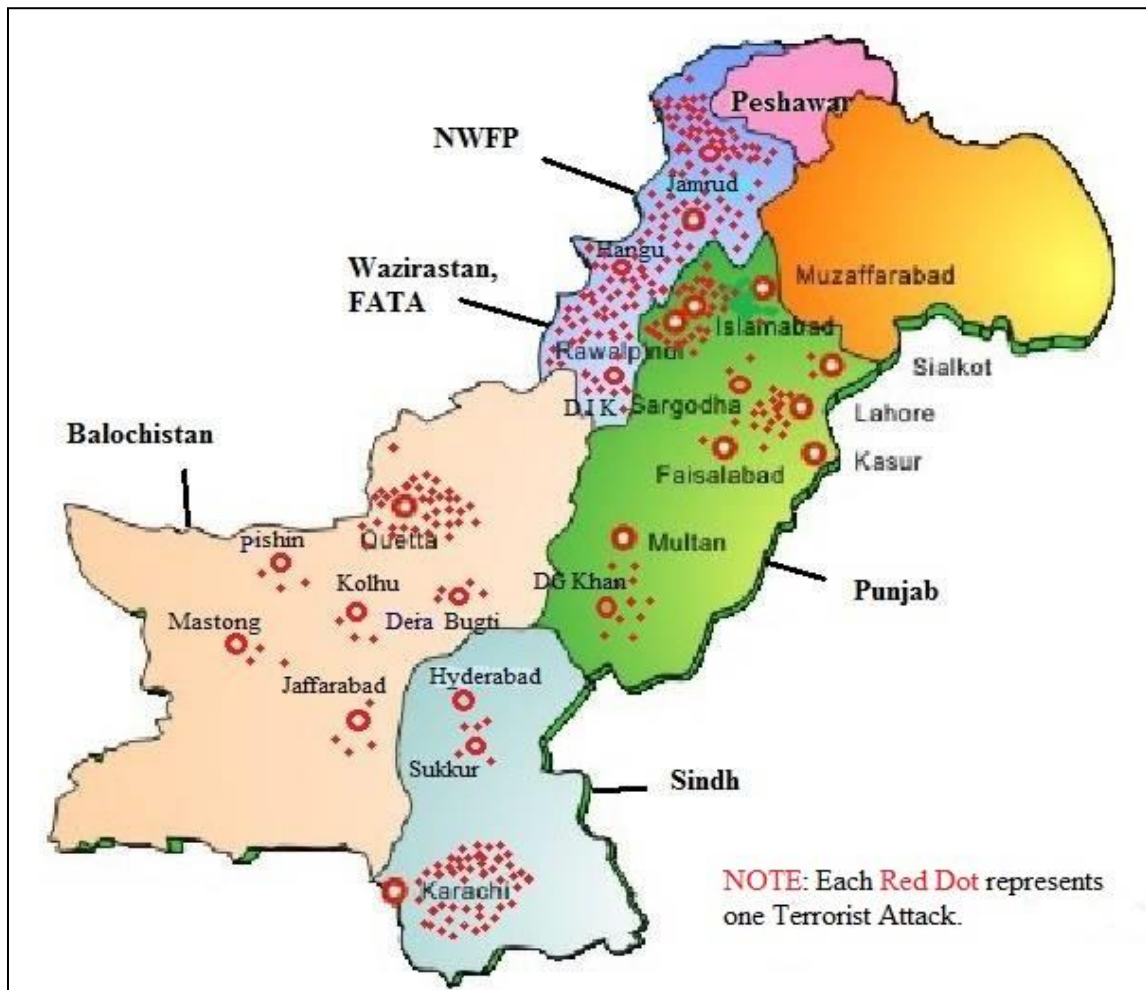


Figure 7: Geographical Distribution of 289 Terrorist Attacks (Study Data Sample)

The study sample can be further broken down according to distribution by city; Figure 9 shows distribution of the attacks according to district and according to the various cities in Pakistan and also shows the frequency of the attacks in each city. It can be seen that the highest number of attacks have occurred in Peshawar (50), followed by Karachi (48) and Quetta (36) respectively.

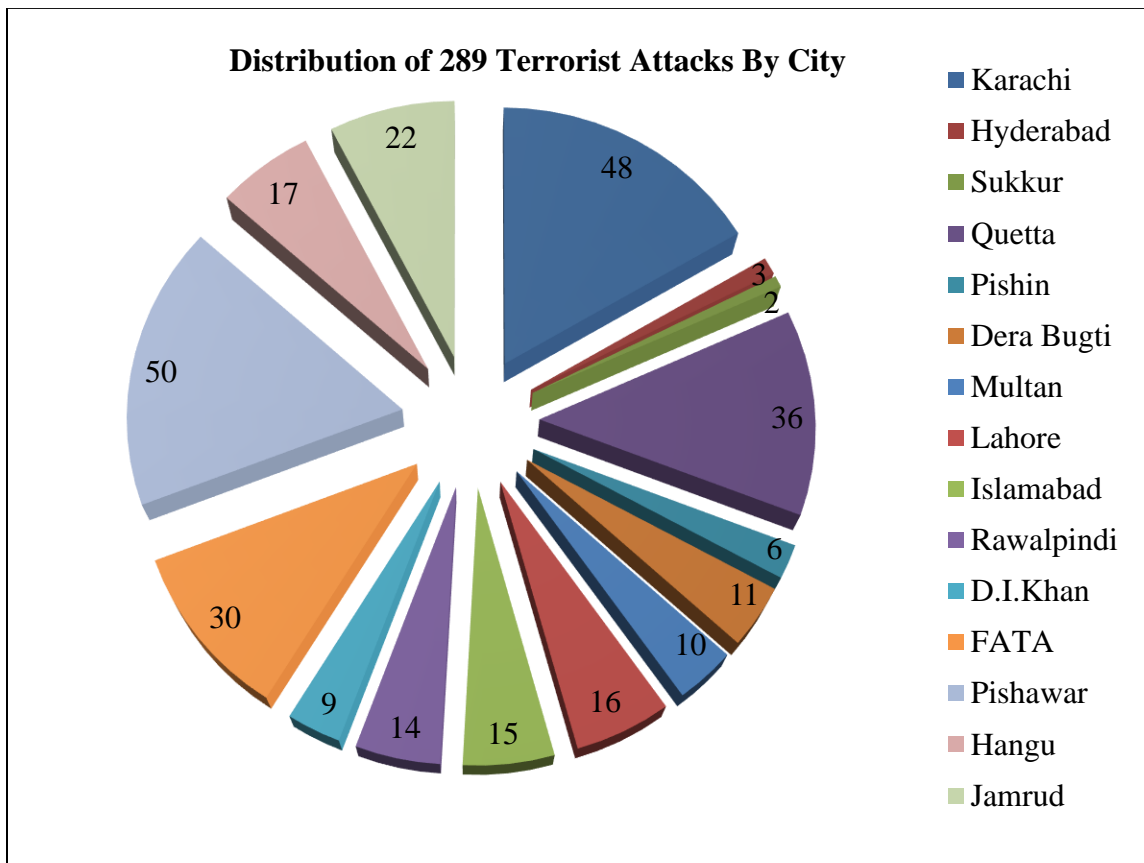


Figure 8: Distribution of 289 Terrorist Attacks by City

3.2.2 Distribution of Natural Disasters

As with terrorist attacks, natural disasters are also widespread all over Pakistan. Figure 10 shows the occurrence of natural disasters according to the various geographical areas of Pakistan. It can be seen that Khyber Pukhtunkhwa houses the most natural disasters.

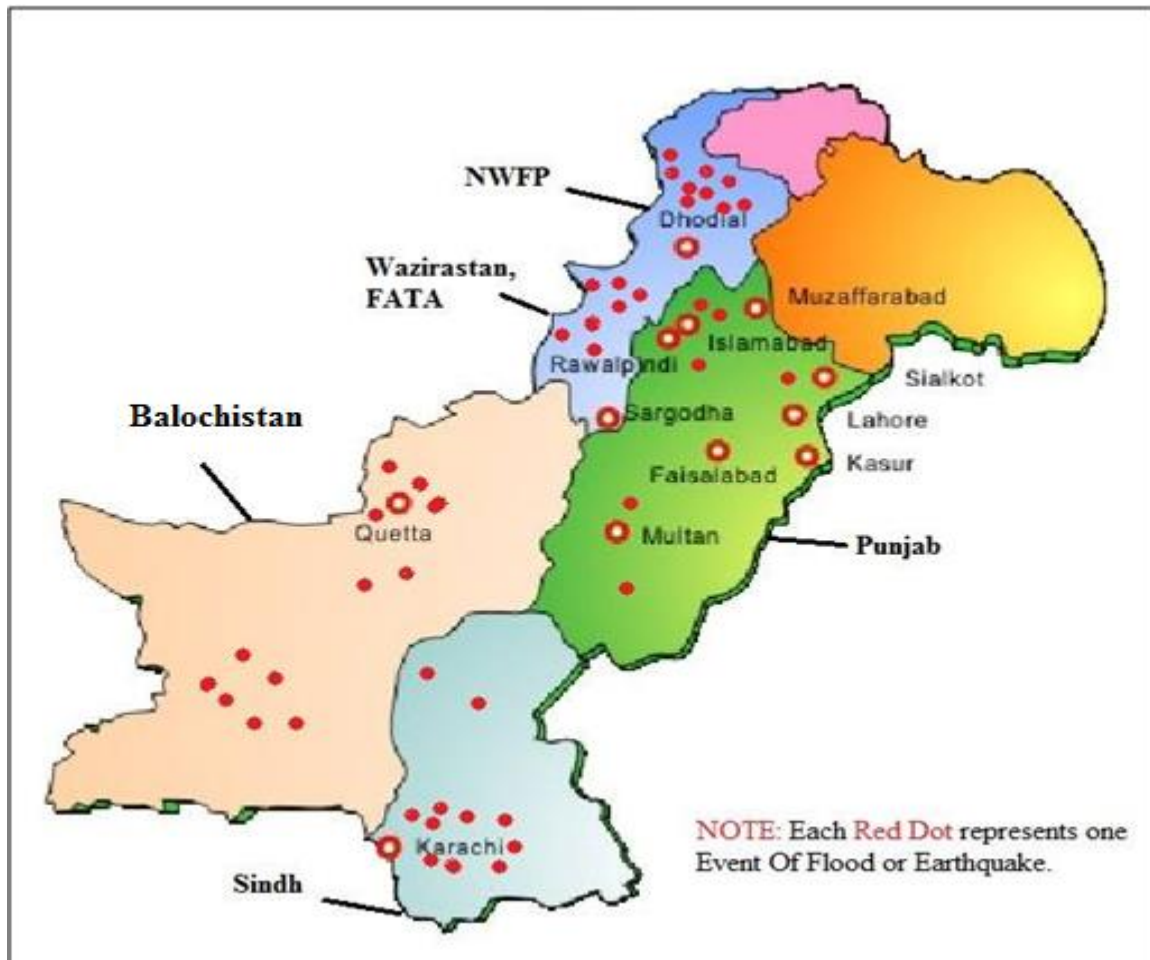


Figure 9: Geographical Distribution of 45 Natural Disasters (Study Data Sample)

Figure 11 below shows the frequency of the natural disasters in each province. The highest number of natural disasters (16) occurred in Khyber Pukhtunkhwa, followed by Baluchistan (12), then Sindh (11) and finally Punjab (6).

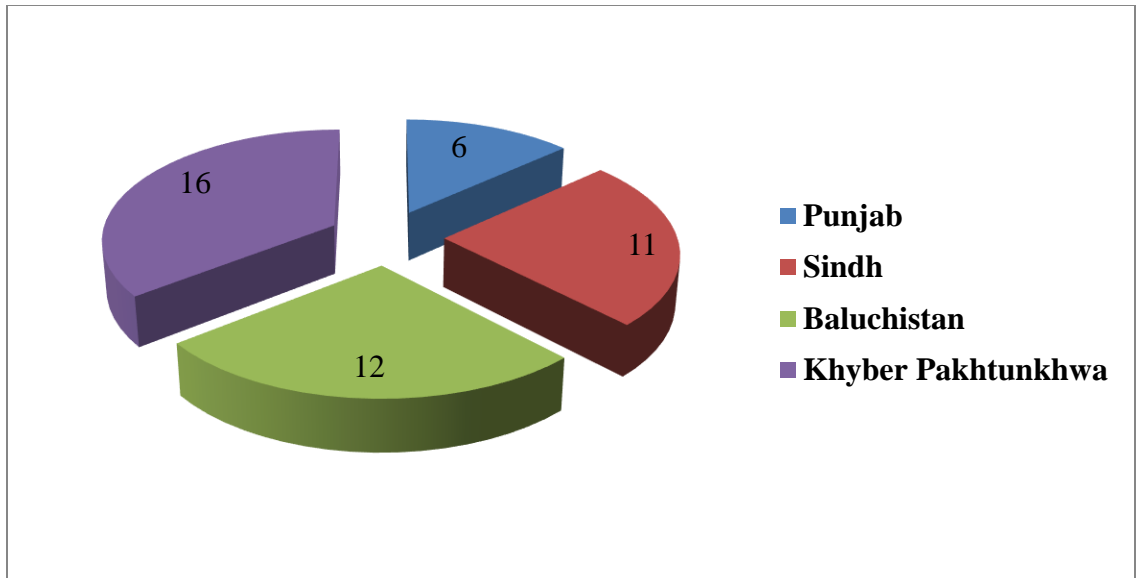


Figure 10: Geographical Distribution & Frequency of 45 Natural Disasters

3.3 EVENT STUDY METHODOLOGY

The event study methodology is widely used in finance research as it is designed to explore the impact of any given event on a specific dependant variable. According to (Chen & Siems, 2004; Abadie & Gardeazabal, 2003) it is the most commonly used method to study the impact of events. The main purpose of this type of methodology is to assess the extent to which security returns are different from those given by the model determining expected returns (Mackinlay, 1997).

In terms of finance related studies, the dependent variable is often the stock price and the study is usually concerned with the changes in stock price identified as ‘abnormal returns’ over the sample period of the study. The abnormal returns are usually attributed to the event in question hence the purpose of the event study methodology is to assess whether or not the abnormality in the return is directly associated with the event.

The event-study methodology is based on the efficient markets hypothesis (Fama, Fisher, Jensen & Roll, 1969). This implies that an assumption is made that the market must be efficient. This means that for any given efficient market the impact of the events in question will immediately be observed and reflected in the stock price of the company. As a result, the researcher is able to review the economic impact of the event over a short period of time.

For this study the Event Study Methodology has been employed as it allows us to scrutinize the returns which are resulting from the closing stock prices of the related banks and insurance companies. The returns can be examined before and after the event; in this study this would be before and after the terrorist event or natural disasters.

As with any event study based methodology, it is necessary to primarily define both the event and period. In this study the 'event' as already mentioned covers both terrorist events and natural disasters. To define these further, in terms of terrorist events these include bombings, explosions and assassinations; in terms of natural disasters, these include floods and earthquakes. The event window for terrorist events is from 5 trading days before the event until 10 trading days after the event (-5 days, +10 days), whereas for natural disasters the event window is from 10 trading days before the event until 15 trading days after the event (-10 days, +15 days). In our study the event day is expressed as $(t=0)$ i.e. the very first trading day after occurring the event.

Once the event and event window have been defined, a particular return generating model must then be adopted. As daily and monthly data differ in potentially important respects and daily stock returns deviate from normality more than monthly returns (Fama, 1970)

therefore daily closing stock prices are used to calculate the daily stock returns, Banking Sector and Insurance Sector respectively by using the formula used by [Chesneya, Reshetarb & Karamana (2011)] i.e.

$$R_{it} = \text{LN} (P_{it} / P_{it-1}).$$

Where:

R_{it} = Index return for period t,

P_{it} = index price at the end of period t,

P_{it-1} = index price at the end of period t - 1.

Abnormal or residual returns are defined as the actual returns which are determined by using the arithmetic percentages less the predicted returns of the banks or insurance company's beta that is market returns. The abnormal returns or residuals represent the piece of the return that is unpredictable and is consequently an approximation of the change in the bank value and insurance company's value due to the event i.e. terrorist attack or natural disaster.

Over the years, researchers have used a number of empirical models to estimate abnormal performance around any given event. Abnormal or excess returns can be calculated by using the event study methodologies proposed by (Brown & Warner, 1980). The market model, market adjusted model and mean adjusted model are amongst the commonly selected models. To calculate the abnormal returns, the Market Adjusted return Model is used.

3.4 MARKET-ADJUSTED RETURN MODEL

In event study literature, one of the most commonly used models is the Market Model; it takes explicit account of any risk associated with the market and mean returns. (Schipper & Thompson, 1983); (Jung, Frank, Kemmna & Klock , 1992) and (Arora, 2001) are just a few examples amongst numerous studies in which the authors have adopted the market adjusted return model. Another major advantage of using this model over others is that it is error-proof and also avoids extra computations associated with estimating security betas. The model uses the well-known Capital Asset Pricing Model (CAPM) assumption, which basically assumes the expected returns of a security to be equal to the market return. This therefore, implies that while the expected return is constant across securities, it is not constant across time, i.e. α and β is set equal to 0 and 1 respectively. The aforementioned advantages of the market model led us to select this model for calculating the abnormal returns in this study. The market-adjusted model assumes the expected return to be equal to the market return. This is mathematically expressed as follows:

$$R_{it} = R_{mt}$$

Where:

R_{it} = the expected return

R_{mt} = the return of the market portfolio

The market adjusted model is used to calculate the abnormal return by using the following formula:

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

Where:

AR_{it} = the abnormal return of stock i at time t

R_{it} = the actual return of stock i at time t

$(\alpha_i + \beta_i * R_{mt})$ = the expected or normal return of stock i at time t

We used the above formula to calculate the bank abnormal returns and insurance companies abnormal returns by considering KSE 100 index returns as market returns.

The mean value of abnormal returns (ARs) is simply calculated by taking the sum of abnormal returns (ARs). It can be expressed by the following equation:

$$AAR_t = (1/N)\sum AR_{it}$$

Where:

AAR_t = the mean value of abnormal return at time t

N = the number of stocks

AR_{it} = the abnormal return of stock i at time t

By using the above equation we calculated the daily abnormal returns of the whole sample. The cumulative abnormal returns (CAR) are calculated by simply calculating the sum of each company's abnormal return across the event period. It can be expressed by the formula below:

$$CAR_i = \sum AR_{it}$$

Where:

CAR_i is the cumulative return of stock i over the event period

AR_{it} is the abnormal return of stock i at time t

There are two possible ways to investigate the impact of events on the stock market. The first is via graphical representation of the result and observation of trends; the second is using a statistical test to examine the significance of daily abnormal returns. The study used both graphical representation and significance test.

The study performed t-statistics as anticipated by Brown & Warner (1980 & 1985) for ARs and CAARs. The following equation is used to check the significance:

$$t\text{-Statistics} = AAR_t * N^{0.5} / S.D_t$$

Where:

N is degree of freedom

AAR_t is the mean value of abnormal return at time t

$S.D_t$ is the standard deviation of abnormal return at time t

CAARs are representative of the mean value of of the total outcome of the event transversely all firms over a specified time period. This therefore allow us to test the significance of an event's impact on the stock returns, banks returns and insurance returns, by considering the variation of returns from their mean values.

For CAARs the following equation is used:

$$t\text{-Statistics} = CAAR_t * N^{0.5} / S.D (ARs)$$

Where:

N = Degree of freedom

$CAAR_t$ is the cumulative mean value of abnormal return at time t

$S.D_t$ is the standard deviation of abnormal return at time t

With the 95% confidence interval and degree of freedom “n” the value greater than 1.96 or the value less than -1.96 is considered positively and negatively significant, respectively.

Hence, we examine terrorism and natural disaster events and use the t-test and following hypotheses to identify the significance of the abnormal returns and the cumulative abnormal returns of each stock, as follows:

$H_1: AAR \neq 0$ & $H_0: AAR=0$

$H_1: CAAR \neq 0$ & $H_0: CAAR=0$

The H_0 hypothesis test illustrates that the market, bank and insurance stocks that are affected by a natural disaster or terrorist event will not show familiarity to market mean value of returns; banks mean value of ARs and insurance mean value of ARs as well as mean value of CARs. Whilst the H_1 hypothesis test illustrates that the market, bank and insurance stocks that are affected by a natural disaster or terrorist event will show negative or positive mean value of ARs or CARs.

4) RESULTS & DISCUSSION

This study examines the effect of terrorism and natural disasters on stock market, bank and insurance company's returns for the period of (2003 to 2017). In this study daily stock prices of 23 banks and 31 insurance companies listed in the Pakistan Stock Exchange of Pakistan are consulted along with daily stock. (Appendix Table A)

4.1 TERRORIST EVENTS

The effect of 289 terrorist attacks from 2003 to 2017 is examined by taking the event window of five days before the event day and ten days after the event day i.e. (-5,+10). Using this event window we calculated the mean value of market returns, mean value of banks ARs (abnormal returns) and mean value of insurance company's ARs (abnormal returns). These were calculated for the event day as well as for pre and post event day period in order to check the effect of event on the returns of stock market, banks and insurance companies.

Similarly, CARs (Cumulative Abnormal Returns) are calculated for 100 index and mean value of CARs are calculated for banks and insurance companies to check the impact of event news on the returns. As mean value of ARs show the effect of event whilst mean value of CARs show the effect of news either it is positive or negative. Fluctuations in returns are the result of severity of the news about the event. By applying the formula of t-statistics the significance level of mean value of ARs and CARs is examined. Appendix Table B showed that these events do not have significant effect on stock market returns but bank returns show a highly negative significant effect of those attacks for the very next day to the event i.e. $-3.47 < -1.96$ and insurance returns are significantly affected by

the events on the event day i.e. $-2.00 < -1.96$. In case of mean value of CARs it showed that as soon as the news comes in the market, it resulted in the fluctuations in the returns of market as well as banks and insurance sector as shown in the graphs below:

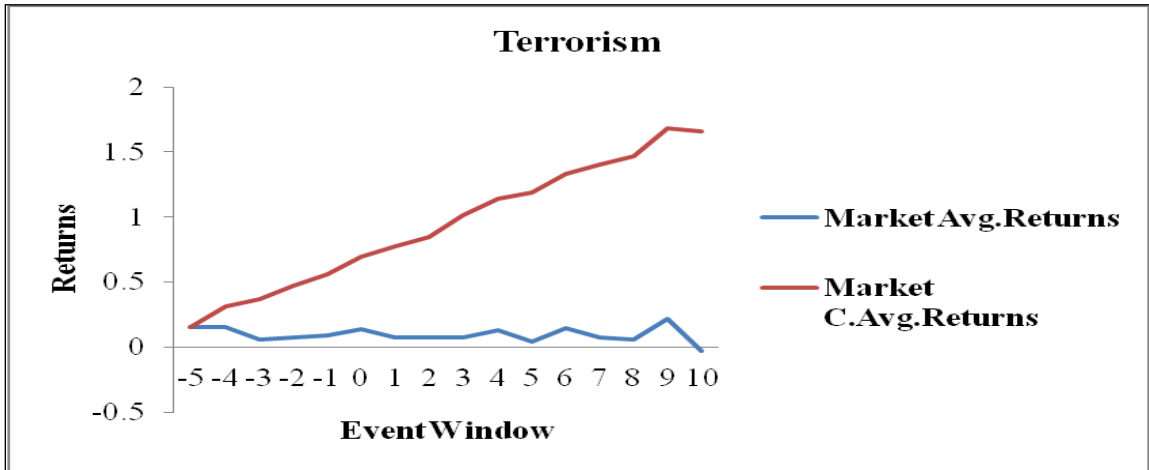


Figure 11: Impact of Terrorism on Mean value of Market Returns & C. Returns.

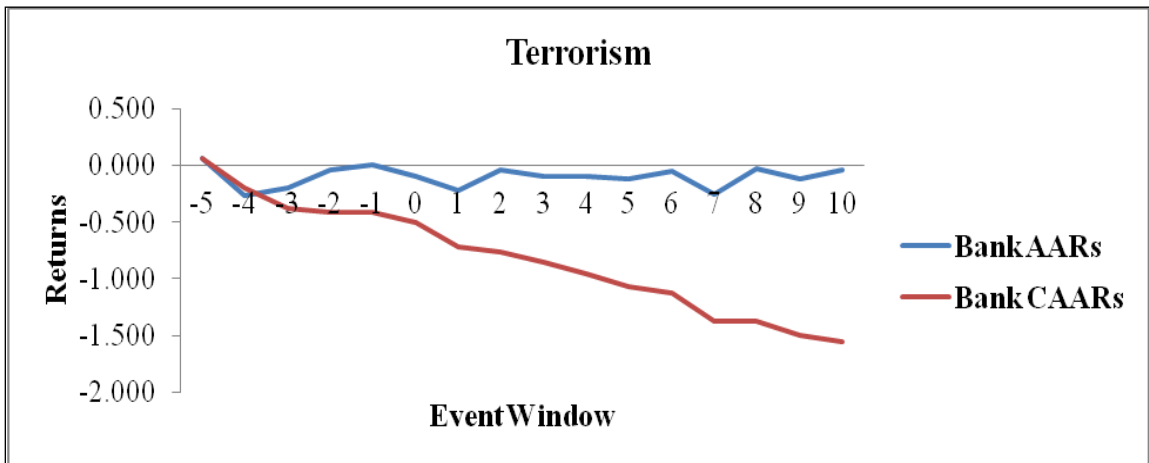


Figure 12: The Impact of Terrorism on Mean value of Bank ARs & Bank CARs

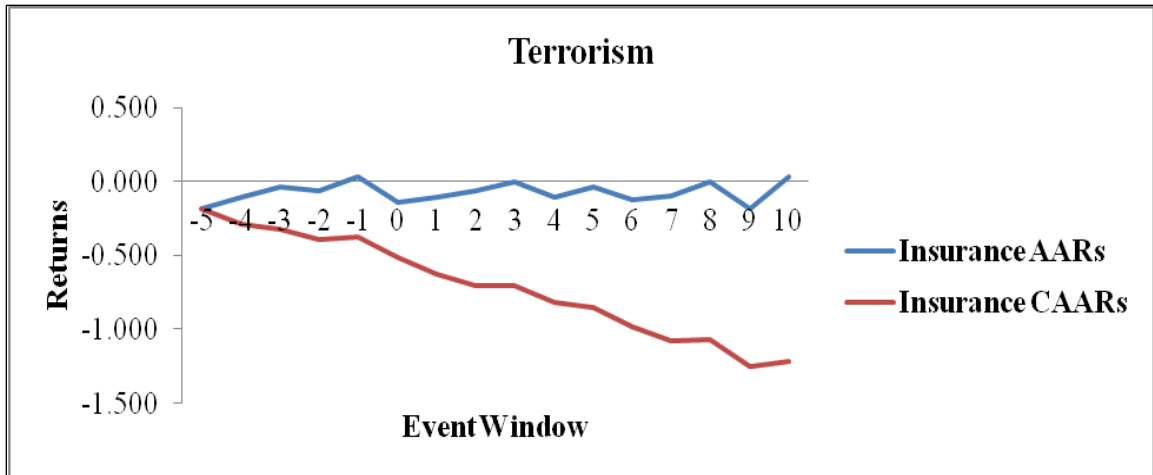


Figure 13: The Impact of Terrorism on Mean value of Insurance ARs & CARs.

These empirical findings show that as compared to the market and banking sectors, the insurance sector shows a significant negative effect in response of the happening of events on the event day. This is because terrorist attacks frequently lead to fatalities, injuries and considerable damage to the property, this demonstrates the sensitivity of insurance sector towards terrorist activities whilst the banking sector shows a lesser effect in response to the number of terror attacks on the event day. The reason behind it can be that banking operations are quite different and are not directly associated to those business activities which suffered from terror attacks. Our findings support the results of (Abadie & Gardeazabal, 2003); (Raby, 2003); (Enders, Sandler & Parise, 1992) that categorize the tourism, airline and insurance sector predominantly to the terrorist events. (Brown et al. ; 2004) examined cumulative abnormal returns (CARs) for 9/11 and endow with evidence that 9/11 increased the instability of insurance stocks returns.

By examining the impact of bomb blasts on stock market returns it is seen that market is not showing abnormality in the returns and there is no significant effect of attack seen on

the returns. It is because of the reason that at initial stages when terrorist attacks started, the stock market crashed however, terrorist attacks are now considered as routine activity. Due to terrorist attack there seems fluctuation in returns but there is 95% confidence level that the stock market will not crash and only a 5% chance that the stock market will crash due to the event.

4.2 NATURAL DISASTER EVENTS

Similarly, we examined the effect of natural disasters (floods and earthquakes) on the stock market, banks and insurance companies for the same time period i.e. 2003 to 2017, by taking the same sample as mentioned above. For natural disasters we firstly examined the combined effect of floods and earthquakes on returns of 100 index and both sectors by taking the event window of 26 days i.e. 10 days before the event and 15 days after the happening of event.

The combined effect of floods and earthquakes was examined on mean value of stock returns, mean value of banks ARs and insurance companies ARs; however, no significant effect on the returns was found (See Appendix Table C).

We also checked the individual impact of floods and earthquakes and calculated the mean value of ARs and CARs for bank and insurance companies as well as for market returns. By doing so the results showed that floods do not have a significant effect on event day as its t-statistics on event day is -1.84 but it affects the mean value of banks ARs within the week i.e. 5th day after the event i.e. -2.97 which is less than -1.96 which shows that floods hit the bank ARs negatively insignificantly. This is because the rehabilitation process of floods is long term so floods do not show an immediate effect. The mean value

of CARs is also positively significant for floods and an increasing trend is shown after the event. As (Chen & Siems, 2004) have investigated the banking sector's vital responsibility during the shocks. They argued that in an economy, banking sector plays a vital role in case of shocks to endure and promptly absorb after effects of external & endogenous shocks.

As floods can be forecasted, returns can be protected before the event occurs and that is why floods do not have significant effect on AARs of insurance and stock market returns. But the CAAR value shows the significant negative impact of event news on and after the event day on insurance returns and positive significant impact on market returns.

While in case of earthquakes as these are unexpected so, by examining the effect of earthquakes it is shown the volatility in stock market return i.e. $-2.67 < -1.96$ which shows negative significant impact on event day's stock returns and its cumulative returns are significant before the event day but on the event day they behave insignificantly. While volatility is shown on banks and insurance companies mean value of ARs after the event day which continued for two days however, there is no significant impact of news and event on banks and insurance company's AARs and CAARs. (See Appendix D)

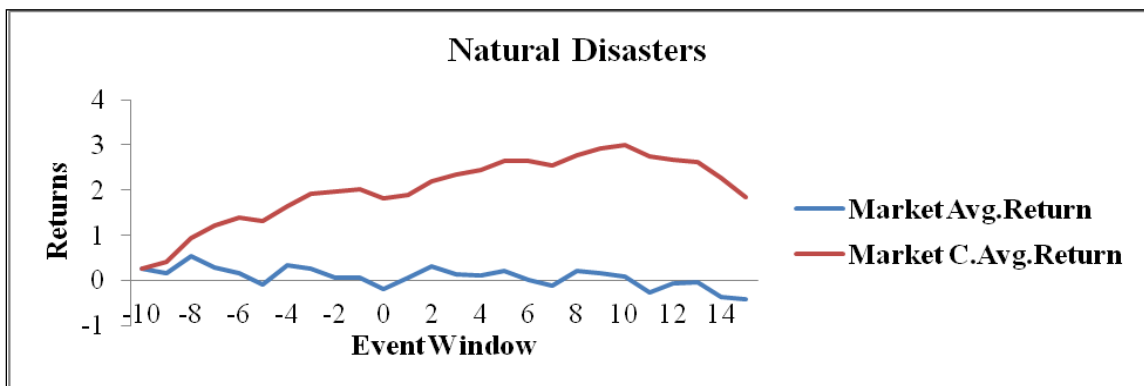


Figure 14: Impact of Natural Disasters on Mean value of Market & C. Returns.

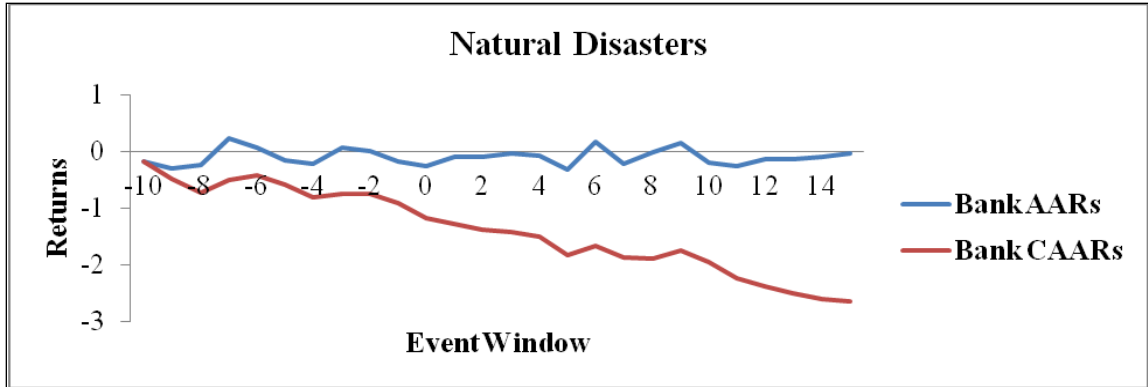


Figure 15: The Impact of Natural Disasters on Mean value of Bank ARs & CARs.

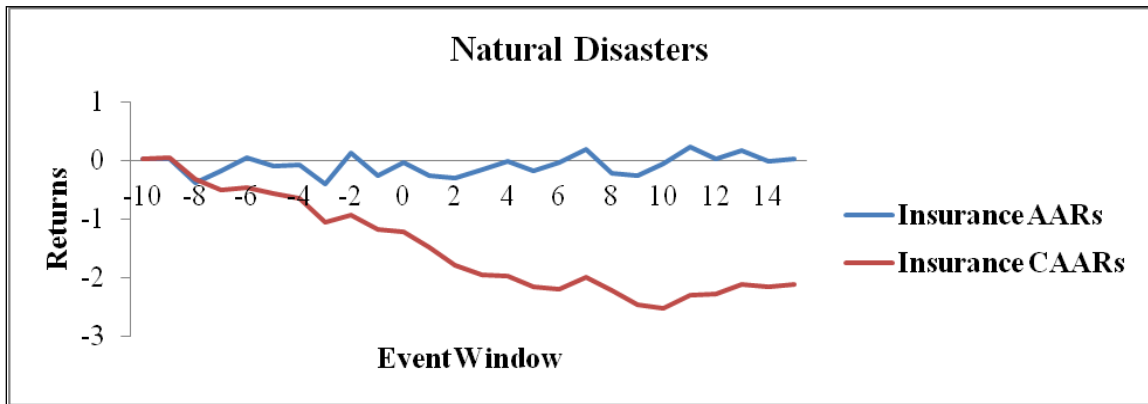


Figure 16: The Impact of Natural Disasters on Mean value of Insurance ARs & CARs.

5) CONCLUSION & POLICY IMPLICATIONS

5.1 CONCLUSION

The study has focused on examining the effects of natural disasters and terrorism on stock market prices including 100 index, banking sector and insurance companies. Terrorism events are discussed by taking 289 events (including Bombings / Explosions and Assassinations) whilst natural disasters are discussed by considering 45 events of earthquakes and floods for the period of (2003 to 2017). For the analysis daily stock prices of 100 index and of 23 banks and 32 insurance companies has been taken by

conducting event study methodology. In order to calculate the abnormal returns 100 index is used as a benchmark. The market adjusted return model is used to calculate the abnormal returns by taking KSE 100 index as a benchmark.

The effect of 289 terror attacks from 2003 to 2017 is examined by taking the event window of five days prior the event day and ten day after the event day i.e. (-5,+10). The empirical findings show that as compared to the market and banking sectors, the insurance sector shows a significant negative effect in response to the happening of events on the event day because terrorist attacks frequently lead to fatalities, injuries and considerable damage to the property which shows the sensitivity of insurance sector towards terrorist activities, whilst the banking sector shows the less effect in response of the number of terror attacks on the event day. By examining the impact of bomb blasts on stock market returns it is shown that market returns are insignificant.

A combined effect of floods and earthquakes on stocks returns, mean value of bank ARs and insurance companies ARs are insignificant, however individual examination of both types of events has shown that floods affect the bank returns insignificantly; while earthquakes affect the market returns insignificantly. No significant effect is shown on insurance company's returns.

1.2 LIMITATIONS OF THE STUDY

Some of the findings of this study are found to be statistically significant while others remained statistically insignificantly. As with any piece of research, this study is not without its limitations. The following have been identified as the major limitation to this study:

- The definitions of “Terrorist Events” and “Natural disasters” is subjective to the author’s opinions, and will therefore vary from one study to another thus effecting the magnitude of the impact which will subsequently affect the result.
- The event-study methodology assumes that the market must be efficient suggesting that for any given efficient market the impact of the events in question will immediately be observed and reflected in the stock price of the company. It cannot be guaranteed however, that the entire sample used in this study completely fulfils the assumption and so the results may be biased.

1.3 POLICY IMPLICATIONS OF THE STUDY

The results of this study have implications for investors, the Government and stakeholders. Observing the magnitude of the effect of events on the Stock Exchange allows one to predict the effect of future terrorist attacks and natural disasters on the stock market. This means that reactions of the stock market in the future will not be unexpected for policy makers and other stakeholders, as they will be able to predict the direction of change in the stock. This will allow investors to make more informed decisions regarding stock. Government should also promote the financial markets. As if financial markets will operate properly then ultimately the economy of the country will grow in a better way.

5.4 FUTURE DIRECTIONS

After reviewing the methodology and conclusion of the findings from this study, a number of recommendations can be made in order to both improve and continue the research in this field. The most important and relevant of these recommendations are:

- To expand the study area by including other countries in order to carry out a comparison of the results on worldwide basis.
- To apply different models of analysis for example the GARCH and ARCH models in order to see if any changes are observed in the test for significance.

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APPENDIX

Appendix A: List of Banks & Insurance companies

	Banks		Insurance Companies
1	Bank Of Punjab	1	EFU Life Assurance Ltd
2	Bank Al Habib Ltd	2	American Life Insurance Co of Pakistan
3	Askari Bank Ltd	3	East West Life Assurance Co.Ltd
4	Faisal Bank Ltd	4	EFU General Insurance Ltd
5	Habib Metropolitan Bank Ltd	5	Universal Insurance Co Ltd
6	Soneri Bank Ltd	6	United Insurance Co.of Pkistan Ltd
7	MCB Bank	7	Standard Insurance Co Ltd
8	Silk Bank Ltd	8	Silver Star Insurance Co Ltd

9	National Bank of Pakistan	9	Shaheen Insurance Co.Ltd
10	Meezan Bank Ltd	10	Reliance Insurance Co.Ltd
11	KASB Bank	11	Progressive Insurance Co.Ltd
12	NIB Bank Ltd	12	Pakistan General Insurance Co.Ltd
13	Samba Bank	13	Pakistan Guarantees Insurance Co.Ltd
14	Bank Al Falah	14	Jubilee General Insurance Co Ltd
15	Apna Microfinance Bank Ltd	15	IGI Insurance Ltd
16	United bank Ltd	16	Hallmark insurance
17	Allied Bank	17	Habib Insurance Co.Ltd
18	Bank of Khyber Ltd	18	East West Insurance Co.Ltd
19	Bank Islami Pakistan	19	CYAN Ltd
20	JS Bank Ltd	20	Crescent Star Insurance Co.Ltd
21	Standard Chartered Bank	21	Century Insurance Co.Ltd
22	Habib Bank Ltd	22	Business & Industrial Insurance Co Ltd
23	Summit Bank Ltd	23	Adamjee Insurance Co.Ltd
		24	Asia Insurance Co.Ltd
		25	Askari General Insurance Co.Ltd
		26	Beema Pakistan Co Ltd
		27	Pakistan Reinsurance Co.Ltd
		28	Jublee Life Insurance Co.Ltd
		29	Atlas Insurance
		30	PICIC Insurance
		31	Premier Insurance Co.Ltd

Appendix B: Impact of Terrorism on Financial Markets

Market Returns & Cumulative Market Returns

Event Window		Market Avg. returns	S.D of Market Avg.	Market T-Statistics	Market C.Avg. returns	S.D of Market C.returns	Market T-Statistics
	-5	0.156	1.258	2.102	0.156	1.258	2.102
	-4	0.155	1.327	1.986	0.311	1.952	2.705
(-5,0)	-3	0.055	1.222	0.767	0.366	2.438	2.551
	-2	0.071	1.284	0.936	0.473	2.917	2.755
	-1	0.086	1.278	1.142	0.557	3.347	2.829
	Event Day	0.137	1.414	1.648	0.694	3.828	3.08
	1	0.076	1.311	0.985	0.772	4.209	3.118
	2	0.073	1.392	0.897	0.843	4.416	3.244
	3	0.071	1.258	0.96	1.015	4.166	4.142
	4	0.133	1.353	1.674	1.144	4.424	4.397
(0,10)	5	0.038	1.325	0.486	1.186	4.88	4.133
	6	0.148	1.214	2.076	1.335	5.088	4.46
	7	0.072	1.313	0.93	1.407	5.487	4.358
	8	0.058	1.262	0.78	1.465	5.786	4.305
	9	0.216	1.202	3.062	1.682	6.135	4.66
	10	-0.03	1.287	-0.39	1.654	6.527	4.309
Bank AARs & CAARs							
Event Window		Bank AARs	S.D of Bank ARs	Bank T-Statistics	Bank CAARs	S.D of Bank CARs	Bank T-Statistics
	-5	0.058	2.443	0.404	0.058	2.443	0.404
	-4	-0.263	2.435	-1.835	-0.203	1.556	-2.222
(-5,0)	-3	-0.198	0.950	-3.542	-0.375	1.905	-3.346
	-2	-0.038	1.138	-0.569	-0.414	2.162	-3.259
	-1	0.000	1.183	0.005	-0.413	2.439	-2.877
	Event Day	-0.093	1.101	-1.438	-0.503	2.658	-3.215
	1	-0.217	1.021	-3.619	-0.722	2.937	-4.178
	2	-0.040	1.047	-0.653	-0.762	3.110	-4.167

	3	-0.097	0.994	-1.652	-0.856	3.194	-4.556
	4	-0.099	1.065	-1.582	-0.951	3.264	-4.954
(0,10)	5	-0.118	1.139	-1.754	-1.067	3.441	-5.273
	6	-0.056	1.139	-0.840	-1.124	3.630	-5.262
	7	-0.251	1.070	-3.985	-1.377	3.886	-6.023
	8	-0.032	1.110	-0.496	-1.372	3.965	-5.884
	9	-0.120	1.148	-1.778	-1.501	4.126	-6.184
	10	-0.038	1.094	-0.586	-1.554	4.149	-6.366
Insurance AARs & CAARs							
	Event Window	Insurance AARs	S.D of Insurance ARs	Insurance T-Statistics	Insurance CAARs	S.D of Insurance CARs	Insurance T-Statistics
	-5	-0.182	1.079	-2.863	-0.182	1.079	-2.863
	-4	-0.106	1.236	-1.458	-0.287	1.772	-2.753
(-5,0)	-3	-0.041	1.044	-0.669	-0.327	2.108	-2.636
	-2	-0.064	1.173	-0.929	-0.389	2.635	-2.509
	-1	0.035	1.182	0.501	-0.377	3.037	-2.108
	Event Day	-0.144	1.225	-2.003	-0.518	3.251	-2.708
	1	-0.110	1.149	-1.625	-0.629	3.436	-3.110
	2	-0.064	1.235	-0.879	-0.703	3.724	-3.208
	3	-0.002	1.057	-0.033	-0.702	3.864	-3.090
	4	-0.107	1.158	-1.573	-0.817	4.207	-3.301
(0,10)	5	-0.034	1.092	-0.536	-0.856	4.340	-3.352
	6	-0.123	1.101	-1.902	-0.979	4.532	-3.672
	7	-0.099	1.121	-1.501	-1.080	4.852	-3.783
	8	-0.006	1.120	-0.088	-1.069	5.168	-3.516
	9	-0.184	1.155	-2.702	-1.250	5.236	-4.059
	10	0.032	1.182	0.467	-1.214	5.568	-3.708

Appendix C: Impact of Natural Disasters on Financial Markets

Market Avg returns & Cumulative Avg.returns
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Event Window		Market Avg. Return	S.D of Market Avg. Return	Market T-Statistics	Market C.Avg. Return	S.D of Market C>Returns	Market T-Statistics
	-10	0.252	1.787	0.947	0.252	1.755	0.965
	-9	0.158	1.219	0.869	0.410	2.359	1.167
	-8	0.530	1.536	2.316	0.941	2.538	2.486
	-7	0.286	1.307	1.468	1.227	2.830	2.907
	-6	0.159	1.401	0.761	1.385	3.403	2.731
	-5	-0.081	1.606	-0.336	1.305	4.070	2.151
	-4	0.342	1.682	1.366	1.647	4.377	2.525
	(-10,0)	0.263	1.450	1.219	1.911	4.572	2.804
	-2	0.052	1.504	0.230	1.962	4.497	2.927
	-1	0.054	1.446	0.249	2.016	5.055	2.675
Event Day	0	-0.199	1.586	-0.842	1.817	4.650	2.621
	1	0.067	1.390	0.322	1.884	5.120	2.468
	2	0.313	1.383	1.518	2.197	5.390	2.734
	3	0.143	1.158	0.826	2.339	5.543	2.831
	4	0.112	1.431	0.527	2.452	6.115	2.690
	(0,15)	0.203	1.342	1.016	2.655	6.647	2.680
	6	0.001	1.378	0.004	2.656	6.664	2.674
	7	-0.102	1.573	-0.435	2.554	7.015	2.442
	8	0.214	1.870	0.766	2.767	7.864	2.361
	9	0.150	1.730	0.583	2.918	8.047	2.433
	10	0.090	1.515	0.397	3.008	8.398	2.402
	11	-0.272	1.522	-1.199	2.736	8.668	2.117
	12	-0.061	1.222	-0.336	2.675	8.606	2.085
	13	-0.045	1.262	-0.240	2.629	8.656	2.038
	14	-0.355	1.641	-1.450	2.275	8.989	1.698
	15	-0.423	1.689	-1.680	1.852	9.215	1.348
Bank AARs & CAARs							
Event Window	Bank AARs	S.D of Bank Ars	Bank T-Statistics	Bank CAARs	S.D of Bank CARs	Bank T-Statistics	

	-10	-0.181	1.197	-1.016	-0.177	1.163	-1.023
	-9	-0.303	0.939	-2.164	-0.480	1.572	-2.049
	-8	-0.250	1.071	-1.565	-0.730	2.103	-2.329
	-7	0.226	0.980	1.546	-0.504	2.692	-1.256
	-6	0.072	1.160	0.416	-0.432	2.862	-1.013
	-5	-0.160	1.250	-0.860	-0.589	3.224	-1.225
	-4	-0.214	1.261	-1.136	-0.803	3.370	-1.597
(-10,0)	-3	0.057	1.329	0.287	-0.746	3.738	-1.338
	-2	0.001	0.725	0.005	-0.745	3.617	-1.382
	-1	-0.174	0.923	-1.265	-0.915	3.694	-1.662
Event Day	0	-0.262	1.131	-1.553	-1.177	3.665	-2.155
	1	-0.105	0.964	-0.730	-1.282	4.100	-2.098
	2	-0.105	1.201	-0.585	-1.387	4.239	-2.195
	3	-0.042	0.977	-0.287	-1.429	4.300	-2.229
	4	-0.083	1.092	-0.513	-1.512	4.364	-2.324
(0,15)	5	-0.317	1.033	-2.059	-1.829	4.737	-2.591
	6	0.170	1.074	1.064	-1.659	4.735	-2.351
	7	-0.221	1.053	-1.410	-1.880	4.676	-2.698
	8	-0.008	0.908	-0.062	-1.889	4.937	-2.566
	9	0.139	1.187	0.784	-1.753	5.297	-2.220
	10	-0.211	0.947	-1.491	-1.964	5.341	-2.466
	11	-0.270	1.056	-1.716	-2.234	5.344	-2.804
	12	-0.149	0.922	-1.086	-2.383	5.414	-2.953
	13	-0.131	1.239	-0.710	-2.511	5.783	-2.913
	14	-0.098	1.172	-0.563	-2.610	6.077	-2.881
	15	-0.040	1.001	-0.266	-2.649	6.165	-2.883

Insurance AARs & CAARs

Event Window	Insurance AARs	S.D of Insurance Ars	Insurance T-Statistics	Insurance CAARs	S.D of Insurance CARs	Insurance T-Statistics	
	-10	0.018	1.285	0.094	0.018	1.271	0.093
	-9	0.029	1.255	0.154	0.046	2.024	0.154
	-8	-0.376	1.236	-2.041	-0.330	2.574	-0.859
	-7	-0.183	0.957	-1.281	-0.513	2.962	-1.161

	-6	0.050	0.976	0.343	-0.463	3.103	-1.000
	-5	-0.103	1.325	-0.520	-0.563	3.597	-1.050
	-4	-0.086	1.870	-0.307	-0.649	4.632	-0.940
(-10,0)	-3	-0.404	1.309	-2.073	-1.053	4.779	-1.478
	-2	0.119	1.080	0.737	-0.934	4.468	-1.403
	-1	-0.255	1.263	-1.354	-1.184	4.704	-1.688
Event Day	0	-0.032	1.506	-0.141	-1.215	4.648	-1.754
	1	-0.263	1.174	-1.501	-1.478	4.845	-2.046
	2	-0.302	1.222	-1.659	-1.780	4.938	-2.418
	3	-0.169	1.377	-0.821	-1.949	5.211	-2.509
	4	-0.020	1.284	-0.104	-1.969	5.923	-2.230
(0,15)	5	-0.189	1.305	-0.969	-2.157	6.233	-2.322
	6	-0.031	1.007	-0.208	-2.189	6.166	-2.381
	7	0.195	1.243	1.052	-1.994	6.297	-2.124
	8	-0.224	1.167	-1.290	-2.218	6.884	-2.161
	9	-0.257	1.340	-1.285	-2.469	7.194	-2.302
	10	-0.058	1.201	-0.325	-2.527	7.293	-2.324
	11	0.217	1.273	1.145	-2.310	7.233	-2.142
	12	0.033	1.155	0.190	-2.277	7.083	-2.157
	13	0.158	0.964	1.096	-2.123	7.008	-2.032
	14	-0.025	1.436	-0.118	-2.148	7.140	-2.018
	15	0.031	1.138	0.181	-2.117	7.264	-1.955

Appendix D: Impact of Natural Disasters on Financial Markets (Separate Effect of events)

Event Window	Earth Quake				Floods			
	Market Avg.return	Market t-statistics.	Market C.Avg Return	Market t-statistics..	Market Avg. Return	Market T-Statistics	Market C.Avg. Return	Market T-Statistics
-9	0.079	0.314	0.728	1.459	0.183	0.809	0.308	0.701
-8	0.007	0.020	0.735	1.237	0.700	2.536	1.007	2.160
-7	0.580	2.201	1.315	2.085	0.191	0.804	1.198	2.285
-6	0.579	1.830	1.894	2.426	0.023	0.094	1.221	1.953

-5	-0.021	-0.094	1.873	2.824	-0.100	-0.327	1.121	1.445
-4	0.108	0.338	1.981	2.981	0.418	1.358	1.539	1.831
-3	0.984	3.244	2.964	3.685	0.031	0.119	1.570	1.823
-2	-0.038	-0.128	2.926	3.019	0.081	0.294	1.651	1.989
-1	0.025	0.072	2.952	2.338	0.063	0.234	1.713	1.875
Event Day	-1.083	-2.672	1.869	1.388	0.087	0.328	1.800	2.199
1	0.248	0.850	2.117	1.495	0.008	0.031	1.808	1.984
2	0.584	1.349	2.701	1.988	0.226	0.990	2.034	2.081
3	-0.080	-0.345	2.620	1.947	0.215	1.006	2.249	2.220
4	-0.415	-1.236	2.206	1.469	0.283	1.118	2.531	2.269
5	-0.138	-0.366	2.067	1.331	0.314	1.342	2.845	2.330
6	0.435	1.250	2.502	1.738	-0.140	-0.576	2.706	2.182
7	0.198	0.528	2.700	1.723	-0.199	-0.697	2.507	1.929
8	0.221	0.428	2.921	1.694	0.211	0.640	2.718	1.861
9	-0.353	-0.781	2.568	1.577	0.313	1.064	3.031	2.009
10	0.284	0.924	2.852	1.826	0.027	0.095	3.058	1.924
11	0.024	0.073	2.876	1.642	-0.368	-1.281	2.690	1.654
12	0.502	1.891	3.378	1.976	-0.243	-1.122	2.447	1.514
13	0.354	2.716	3.732	2.178	-0.174	-0.726	2.273	1.400
14	0.063	0.322	3.795	2.090	-0.490	-1.563	1.783	1.063
15	0.232	0.784	4.027	2.343	-0.635	-2.084	1.148	0.665
Event Window	Earth Quake				Floods			
	Bank AARs	Bank T-Statistics	Bank CAARs	Bank T-Statistics	Bank AARs	Bank T-Statistics	Bank CAARs	Bank T-Statistics
-9	-0.472	-1.654	-0.261	-0.524	-0.248	-1.561	-0.551	-2.054
-8	0.418	3.053	0.157	0.283	-0.466	-2.463	-1.017	-2.791
-7	0.574	1.747	0.732	0.899	0.113	0.717	-0.904	-2.024
-6	-0.301	-0.581	0.431	0.475	0.193	1.215	-0.711	-1.480
-5	0.010	0.038	0.441	0.457	-0.217	-0.960	-0.922	-1.676
-4	-0.494	-1.018	-0.053	-0.048	-0.123	-0.636	-1.045	-1.861
-3	0.017	0.038	-0.037	-0.029	0.070	0.321	-0.975	-1.571
-2	-0.115	-0.397	-0.152	-0.131	0.038	0.340	-0.937	-1.526

-1	-0.181	-1.011	-0.333	-0.284	-0.172	-0.994	-1.104	-1.754
Event Day	0.045	0.182	-0.288	-0.242	-0.361	-1.840	-1.465	-2.384
1	-0.027	-0.191	-0.315	-0.251	-0.130	-0.710	-1.595	-2.270
2	-0.276	-0.841	-0.590	-0.554	-0.050	-0.234	-1.645	-2.150
3	0.344	1.157	-0.246	-0.235	-0.167	-1.059	-1.811	-2.340
4	-0.517	-2.306	-0.763	-0.681	0.057	0.291	-1.755	-2.234
5	0.294	1.139	-0.469	-0.392	-0.515	-2.974	-2.269	-2.682
6	0.251	0.906	-0.217	-0.176	0.144	0.763	-2.125	-2.535
7	-0.182	-0.527	-0.399	-0.309	-0.234	-1.340	-2.359	-2.892
8	0.017	0.064	-0.382	-0.264	-0.016	-0.104	-2.376	-2.798
9	0.473	1.056	0.091	0.051	0.027	0.151	-2.349	-2.720
10	-0.070	-0.240	0.020	0.011	-0.256	-1.614	-2.605	-2.989
11	-0.422	-1.571	-0.401	-0.238	-0.221	-1.192	-2.827	-3.166
12	-0.481	-3.026	-0.883	-0.511	-0.042	-0.246	-2.868	-3.153
13	-0.149	-1.004	-1.032	-0.578	-0.125	-0.513	-2.990	-3.035
14	0.159	0.731	-0.873	-0.485	-0.182	-0.838	-3.171	-3.036
15	0.104	0.389	-0.769	-0.457	-0.086	-0.488	-3.257	-3.016

Event Window	Earth Quake				Floods			
	Insurance AARS	Insurance t-Statistics	Insurance CAARs	Insurance t-Statistics	Insurance AARS	Insurance t-Statistics	Insurance CAARs	Insurance t-Statistics
-9	0.189	0.887	-0.144	-0.435	-0.023	-0.097	0.108	0.279
-8	-0.051	-0.226	-0.195	-0.498	-0.481	-2.080	-0.373	-0.755
-7	-0.612	-2.305	-0.807	-1.565	-0.044	-0.270	-0.417	-0.741
-6	-0.078	-0.221	-0.885	-1.168	0.091	0.577	-0.326	-0.577
-5	0.031	0.147	-0.854	-1.218	-0.147	-0.578	-0.469	-0.693
-4	0.600	0.861	-0.254	-0.274	-0.308	-1.064	-0.776	-0.893
-3	-0.708	-1.944	-0.963	-0.850	-0.306	-1.330	-1.082	-1.234
-2	0.332	1.285	-0.631	-0.520	0.050	0.253	-1.033	-1.294
-1	0.082	0.269	-0.549	-0.401	-0.367	-1.609	-1.389	-1.687
Event Day	0.598	1.496	0.049	0.038	-0.235	-0.902	-1.625	-2.004

1	-0.133	-0.396	-0.084	-0.057	-0.305	-1.473	-1.929	-2.334
2	-0.378	-1.037	-0.462	-0.338	-0.278	-1.303	-2.207	-2.547
3	0.225	0.710	-0.237	-0.186	-0.296	-1.184	-2.503	-2.686
4	0.326	0.849	0.089	0.061	-0.132	-0.597	-2.634	-2.500
5	-0.106	-0.399	-0.016	-0.012	-0.216	-0.881	-2.850	-2.530
6	-0.608	-1.987	-0.625	-0.477	0.155	0.959	-2.695	-2.371
7	-0.407	-1.272	-1.032	-0.725	0.390	1.821	-2.305	-1.988
8	0.243	0.732	-0.789	-0.572	-0.375	-1.883	-2.680	-2.089
9	0.034	0.119	-0.755	-0.540	-0.354	-1.426	-3.023	-2.254
10	-0.059	-0.175	-0.815	-0.525	-0.058	-0.272	-3.081	-2.289
11	-0.217	-0.747	-1.031	-0.643	0.358	1.556	-2.724	-2.042
12	-0.261	-0.946	-1.292	-0.790	0.128	0.611	-2.596	-1.995
13	0.204	1.068	-1.088	-0.672	0.142	0.783	-2.458	-1.910
14	-0.256	-0.616	-1.345	-0.879	0.050	0.197	-2.408	-1.815
15	-0.247	-0.728	-1.592	-1.083	0.120	0.614	-2.288	-1.680

ABBREVIATIONS

KSE= Karachi Stock Exchange

GTD= Global Terrorism Database

EM-DAT= Emergency Database

VECM= Vector Error Correction Model

OLS= Ordinary least squares

FOREX= Foreign Exchange

FEXR= Foreign Exchange rate

FEXRES= Foreign Exchange Reserve

ARMA= Autoregressive Moving Average

ARMAX= Autoregressive moving average with explanatory variables

TRIA= Terrorism Risk Insurance Act

VECM= Vector Error Correction Model

CAPM= Capital Assets Pricing Model

QMILE= Quasi-maximum likelihood estimator

GARCH= Generalized Autoregressive Conditional Heteroskedasticity

GTI= Global Terrorism Index

IS= Information Systems

STR= Smith Travel Research

ADR= Average Daily Rate

XLM= Xetra Liquidity Measure

HCTB= High casualty Terrorist Bombing

IPS= Institute of Peace Studies

SATP= South Asian Terrorism Portal

CSP= Centre for Systemic Peace

ARDL= Autoregressive Distributed Lag

DOLS= Dynamic Ordinary Least Squares

START= Study of Terrorism and Responses to Terrorism

AARs= Average abnormal returns

ARs= Abnormal returns

CAR= Cumulative abnormal returns

CAARs= Cumulative Average Abnormal Returns

ARCH= Autoregressive Conditional Heteroskedasticity

GDP= Gross Domestic Products

FDI= Foreign Direct Investment