

**The Impact of Extreme Events on Equity Returns:
Empirical Evidence from Karachi Stock Exchange**



Researcher:

Yasin Mahmood

Reg. No. 51-FMS/MSFIN/S08

Supervisor:

Dr. Arshad Hasan

Associate Professor

Muhammad Ali Jinnah University

Islamabad

**Faculty of Management Sciences
INTERNATIONAL ISLAMIC UNIVERSITY,
ISLAMABAD**



Accession No TH-9647

MS
332.64209549
YAI

DATA ENTERED
Sep 14/12

Stock Companies Pakistan

The Impact of Extreme Events on Equity Returns: Empirical Evidence from Karachi Stock Exchange

Yasin Mahmood

Reg. No. 51-FMS/MSFIN/S08

A thesis submitted in partial fulfillment of the requirements for the Degree of Master of
Philosophy/Science in Management with specialization in Finance at
the Faculty of Management Sciences
International Islamic University,
Islamabad

Supervisor

March, 2012

Dr. Arshad Hassan

Associate Professor

Dean Faculty of Management and Social Sciences

Muhammad Ali Jinnah University Islamabad

FORWARDING SHEET

The thesis titled "The Impact of Extreme Events on Equity Returns: Empirical Evidence from Karachi Stock Exchange" submitted by Mr. Yasin Mahmood in partial fulfillment of M.S degree in Management Sciences with specialization in Finance, has been completed under my guidance and supervision. I am satisfied with the quality of student's research work and allow him to submit this thesis for further process as per IIU rules & regulations.

Date: _____

Signature: _____

Name : _____

(Acceptance by the Viva Voice Committee)

Title of Thesis: "The Impact Of Extreme Events On Equity Returns: Empirical Evidence From Karachi Stock Exchange"

Name of Student: Yasin Mahmood

Registration No: 51-FMS/MSFIN/S08

Accepted by the Faculty of Management Sciences, International Islamic University Islamabad, in partial fulfillment of the requirements for the Master of Science/Philosophy Degree in Management Sciences with specialization in Management.

Viva Voce Committee

Dr. Syed Hassan Rizvi
External Examiner *MOU*

Mr. Faizal Rizwan
Internal Examiner *FMS, IIU*

Dr. Ashad Hassan
Supervisor *Associate Prof. MAFCU*

Chairman/ Director/ Head

Dean

Date: 27-2-12 2011

ACKNOWLEDGEMENT

“By the name of Allah, the most gracious, the dispenser of grace

Read by the name of thy sustainer, who has created – created man out of a germ cell!

Read -- for thy sustainer is the most Bountiful one who has taught (man) the use of the pen taught man what he did not know." (Surah Al Alaq).

From the inner of heart, thanks to Almighty ALLAH, the most gracious, the dispenser of grace. he has provided us countless blessing on us including good physical condition, ingenious thoughts and accepted wisdom, lovely parents, brilliant and kind teachers, loving friends and capability to accomplish the course work and Research work. The most special praises and honors are for the GREAT PROPHIT OF ALMIGHTY ALLAH, HAZRAT Muhammad (PBUH) the Apostle of ALMIGHTY ALLAH, who enlightened the spirit of humankind with of strengths and essence of Islam and guided humanity to attain the purposeful knowledge wherever even from China. On another occasion guided us that seeking the knowledge is obligatory for every Muslim (man and woman). I am thankful to my supervisor Dr. Arshad Hassan, for his kind supervision, true supervision, keen interest, priceless suggestions and caring attitudes all over my research work. I tender my sincere thanks to all of my great teachers for care and love during my studies. I pay my gratitude to my Great Mother (Tasleem Akhtar) Great Father (Mahmood Khan), who has always desired to see me glittering high on the skies of success. It was impossible to accomplish this project without heart prayers, sacrifices, and encouragement. moral and financial support of my loving parents. My gratitude will be incomplete if I don't mention my sweet Brothers (Mr. Tahir Mahmood, Mr. Yasir

Mahmood), Loving sister (Sumaira Kouser) caring wife (Tazeem Akhtar), Daughters (Little Hafsa Yasmin and Maham Gull) and loving son (Muhammad Ammar) Friends, (Muhammad Ali, Muhammad Nisar khattak, Hafiz Israr Ahmad, Muhammad Afzal, Muhammad Mudassir Shahzad, Kashif Hamid, Ahmad Fraz) whose prayers are always with me and great contribution during my studies. Words are scarce and deficient to communicate my, self-effecting obligation to my sweet and loving parents for support and prayers for my completion of education.

YASIN MAHMOOD.

COPYRIGHT

© Yasin Mahmood (2012). All rights reserved. No part of this thesis may be reproduced
without the permission of copyright holder.

Abstract

This study provides empirical analyses of different extreme events, for instance, Political Events, i.e. Musharraf's takeover, Musharraf's emergency, and Musharraf's resignation. Some events are Industrial/ Nuclear accidents, i.e. Tsunami & Nuclear incidents in Japan, Nuclear test, i.e. India & Pakistan Nuclear test. One event is Natural disasters, i.e. October 08, 2005 earthquake in Pakistan & Kashmir and Terrorist Events, including 9/11 attacks, Indian Parliament attack, London Bombing, Benazir assassination & Osama Bin Laden assassination. The objective is to assess the impact of different extreme events on returns of Karachi Stock Exchange. Pakistani and Indian Nuclear Test, Musharraf Takeover of October 12, 1999, 9/11 Attacks, London Bombing, October 8, 2005 Earthquake, Benazir Bhutto Assassination and Osama Bin Laden Assassination provided a significant negative impact on stock market returns. Indian Parliament Attacks, Emergency by Musharraf on November 3/ 2007 and Tsunami and Nuclear Meltdown no impact on KSE returns. Some events provide mixed results, for instance, Musharraf Resign provides positive in lower & Middle Quantiles and Negative in Upper Quantiles. Suicide Attacks on POF Wah cantt provide positive in lower & Middle and Negative in Upper Quantiles. Mumbai Attacks provide negative impact in lower & Positive in Upper Quantiles. This study is useful for investors and regulators. The main contribution of this study is the use of a new Quantile Regression Methodology for event studies, rather than using Event Study Method. This is perhaps the first study that is using Quantile Regression instead of using Event Study method.

Key Words: Extreme Events, Event Study, Quantile Regression, GARCH, Terrorism, Political Events, Nuclear test, Natural Disasters.

CONTENTS

Contents

CONTENTS	x
Table of Figures	xiii
List of Tables	xv
1.1. Introduction:	1
1.2. A brief Statement of Research Problem	4
1.3. Research question:	4
1.4. Objectives of the Research	4
1.5. Significance of the study:	4
2. Literature Review	6
2.1. Reaction of Stock Prices to Catastrophes	6
2.2. Terrorism and Stock Market Reaction:	8
2.3. Nuclear and industrial accidents/ Nuclear test	16
2.4. Political Events	20
2.5. Stock Market returns Volatility:	23
2.6. Hypothesis	29
3.1. RESEARCH METHODOLOGY	30
Data description and Methodology: Use of Quantile Regression	31
3.1.1. Data description:	31
3.2. OLS Regression Model	31
3.3. Model: Quantile Regression Model	32
3.4. The following events are under study:	33
3.5. Introduction to Events under Study	34

3.5.1.	Pakistan Nuclear Test 28th May 1998	34
3.5.2.	Takeover by Musharraf:	34
3.5.3.	9/11 Attacks:	34
3.5.4.	Attacks on Indian Parliament 13-12-2001	35
3.5.5.	London Train Bombing	35
3.5.6.	Earthquake 8 October 2005 Pakistan	36
3.5.7.	Emergency Proclamation by Musharraf November 3rd, 2007	36
3.5.8.	Benazir Assassination:	37
3.5.9.	Musharraf Resigne	37
3.5.10.	Mumbai Attacks:	37
3.5.11.	Osama Bin Laden Assassination	38
3.5.12.	Suicide Attacks on Pakistan Ordnance Factories	38
3.5.13.	Earthquake and Tsunami in Japan	38
3.5.14.	Indian Nuclear test 11th May 1998	39
4.1.	October 8Th 2005 Earthquake	40
4.2.	September 11, 2001 Attacks	43
4.3.	Benazir Bhutto Assassination	45
4.4.	Indian Nuclear Test	48
4.5.	Indian Parliament Attacks	51
4.6.	London Bombing 7/7/ 2005	53
4.7.	Mumbai Attacks	56
4.8.	President General Pervez Musharraf Emergency	59
4.9.	President Pervez Musharraf Resign	62
4.10.	General Pervez Musharraf Takeover	65
4.11.	Osama Bin Laden Murder	68

4.12.	Pakistan Nuclear Test.....	70
4.13.	Suicide Attacks on Pakistan Ordnance Factories.....	73
4.14.	Tsunami and Nuclear Meltdown in Japan	76
5.	Conclusion & Recommendations.....	79
5.1.	Conclusion:	79
References	82

Table of Figures

Figure 1 Return October 8Th 2005 Earthquake.....	40
Figure 2 Volatility, October 8Th 2005 Earthquake	40
Figure 3 Returns 9/11 Attacks	43
Figure 4 Volatility 9/11 Attacks	43
Figure 5 Return Benazir Bhutto Assassination.....	45
Figure 6 Volatility Benazir Bhutto Assassination	45
Figure 7 Return, Indian Nuclear Test	48
Figure 8 Volatility, Indian Nuclear Test.....	48
Figure 9 Returns, Indian Parliament Attacks.....	51
Figure 10 Volatility, Indian Parliament Attacks	51
Figure 11 Returns, London Bombing 7/7/ 2005	53
Figure 12 Volatility, London Bombing 7/7/ 2005	53
Figure 13 Returns Mumbai Attacks.....	56
Figure 14 Volatility Mumbai Attacks.....	56
Figure 15 Returns, Musharraf Emergency of Nov 3 2007.....	59
Figure 16 Volatility, Musharraf Emergency of Nov 3 2007.....	59
Figure 17 Returns, President Pervez Musharraf Resign	62
Figure 18 Volatility, President Pervez Musharraf Resign	62
Figure 19 General Pervez Musharraf Takeover.....	65
Figure 20 Volatility, General Pervez Musharraf Takeover	65
Figure 21 Returns. Osama Bin Laden assassination.....	68
Figure 22 Volatility, Osama Bin Laden assassination.....	68

Figure 23 Return, Pakistan Nuclear Test.....	70
Figure 24 Volatility, Pakistan Nuclear Test.....	70
Figure 25 Return, Suicide Attacks on Pakistan Ordnance Factories	73
Figure 26 Volatility, Suicide Attacks on Pakistan Ordnance Factories.....	73
Figure 27 Return, Tsunami and Nuclear Meltdown in Japan	76
Figure 28 Volatility Tsunami and Nuclear Meltdown in Japan.....	76

List of Tables

Table 1 Events Included in Study	33
Table 2 Regression Results Earthquake of October 8, 2005	42
Table 3 Regression Results 9/11 Attacks.....	44
Table 4 Results Benazir Bhutto Assassination	47
Table 5 Regression Results, Indian Nuclear Test.....	50
Table 6 Regression Results, Indian Parliament Attacks	52
Table 7 Regression Results, London Bombing.....	55
Table 8 Regression Results, Mumbai Attacks	58
Table 9 Regression Results, Musharraf Emergency of Nov 3 2007.....	61
Table 10 Regression Results, Musharraf Resign	64
Table 11 Regression Results, Musharraf takeover	67
Table 12 Regression Results, Osama Bin Laden assassination	69
Table 13 Regression Results, Pakistan Nuclear Test.....	72
Table 14 Regression Results, Suicide Attacks on Pakistan Ordnance Factories.....	75
Table 15, Tsunami and Nuclear Meltdown in Japan	77
Table 16 Impact of Events	78



CHAPTER 1

1.1. Introduction:

Extreme events affect our lives, whether directly or indirectly. These events either Man-made or natural disasters, may affect markets in more than one country at a time, for instance. 9/11 attacks, 3/11 2004 Madrid attacks and London attacks of 7/7 2005, etc. Stock market is a very sensitive indicator of economy and various types of events occurring in economy influence it. These events get the attention of people. An extreme event is an event that does not occur frequently, but the results of this event are catastrophic in nature. Due to these events, stock market fluctuates enormously and behaves in the abnormal way. In financial literature (Longin 1996) defined an extreme as *'the lowest daily return (the minimum) or the highest daily return (the maximum) of the stock market index over a given period'* (p.384). These include economic, non-economic events. Non-economic extreme events include nuclear reactor accident, for instance, Three-Mile Island accident and Chernobyl accidents, etc. Natural catastrophes, e.g. Hurricane Katrina, Hurricane Rita, Hurricane Hugo. Earthquake of October 8, 2005 in Pakistan and March 11, 2011 tsunami in Japan may have an impact on the stock market. Terrorist attacks are another type of non-economic events that can affect the stock market. e.g. September 11 Attacks. Benazir Bhutto assassination and Mumbai attacks are

examples of terrorist incidents may have an impact on the stock market, (Narayanan 1996; Beaulieu, Cosset et al. 2005; Barth, Li et al. 2006; Barth, Li et al. 2006; Ayodeji 2009).

Politics also plays an important role in financial markets. Suhardjo (2001) studied the impact of political events on Indonesian stock market and found significant abnormalities due to these events. Political issues can also influence the stock market. However, there is no direct relationship among stock market and political events but a stable political environment is good for economy. Especially foreign investors are more interested in the stable political environment. We can say that a stable political environment is good for economy than an unstable and fragile political situation. Another important aspect is that emerging economies are more sensitive to political events than advanced economies. In a study by (Diamonte, Liew et al. 1996) found that political risk is an important factor that may have an impact on a developing economy more than developed economies.

Extreme Events have some of the key characteristics. They are "unanticipated" and therefore, not able to being handled within the capital base (GIRO 2002). Extreme events are very appropriate to check the efficiency of the stock market when any new information disseminates quickly, and prices react rapidly (Hussein 2006).

A market is Efficient, if the prices of stocks are fully reflecting all available information. According to FAMA (1970) there are three levels of market efficiency, weak form, semi strong form and strong form of efficiency.

Another definition by Relly and Brown (1997) is that a market is efficient in which stock prices are adjusted as quickly as new information arrives in the market.

The notion of market efficient market has its roots in the PhD dissertation "Théorie de la Spéculation" of (Bachelier 1900) submitted to the Sorbonne for his PhD in mathematics. In this thesis, he discussed Brownian motion of price, and explained Efficient Markets in terms of martingales. His work was long way ahead from his era, unfortunately it was ignored until Savage, (1965) discovered it (Sewell 2008).

In financial markets, the word "Efficiency" represents a range of meanings, i.e. allocation efficiency of market and operational efficiency (Rubinstein 1975). In an efficient market, investor can't earn above average profit by using publicly available information, because this information is impounded in stock prices (Milburn 2008).

There are three forms of market efficiency, weak form, semi strong form and strong form of efficiency.

In the weak form of efficiency, all historical prices are available to all investors. Therefore, there is no opportunity for any investor to earn an excess return that has a trading strategy based on historical prices. In a semi, strong form of efficiency historical prices and all public information is available to all investors. This public information includes annual reports of companies, announcements of annual earnings. Stock splits and investment advices. Consequently, any trading strategy based on publicly available information cannot earn excess returns.

In Strong form of efficient market, stock prices exhibit all historical prices and information; public information and even all types of private. In a market that is

characterized as the strong efficiency, excess return cannot be earned by using any type of information, either this information is historical prices or publicly available information (FAMA 1970 ; Copeland and Weston 1988).

An important attribute of these forms is types of information and their dissemination to investors in the market.

1.2.A brief Statement of Research Problem

Efficient Market Hypothesis is an important topic in finance. On this topic, there is a lot of work but very little work is in relation to Pakistani equity market that is an emerging equity market. Extreme events are an important time to test the validity of EMH because these events have a quick reaction on the stock market. This study will investigate that the impact of extreme events on stock market returns.

1.3. Research question:

Did extreme events have a significant impact on returns in stock markets?

1.4. Objectives of the Research

This study has main objectives mentioned below,

1. To explore the reaction of Pakistani stock market to different extreme events
2. To investigate the risk and return relationship in Karachi Stock Exchange during the period, which is under investigation.

1.5. Significance of the study:

This study will contribute to understand the impact of extreme events on Karachi stock exchange (KSE). It will also contribute to explore the impact of extreme events on

financial markets. Event study is the test of semi strong form of market efficiency. A market is efficient in its semi-strong where stock prices reflect all publicly available information and as any new information arrives in market, stock prices quickly reacts and adjust to new equilibrium. Extreme events generate new information; this information may affect the share price in a stock market. The type (negative or positive reaction) and intensity of market reaction depend on the type of news, how quickly and efficiently a market responds on event news and set new prices of stocks. These behaviors of markets are appealing for investors both local and international. By analyzing these dynamics of market, they can make most appropriate and managed decisions.

This study is organized as per under that chapter I introduce the study, research problem, significance of study. Chapter II provides the review of the literature, the impact of different types of extreme events on the stock market. Chapter III describes the data and events under investigation. Chapter IV provides data analysis and diagram; Chapter V concludes the thesis and provides implications and direction for future research.

CHAPTER 2

2. Literature Review

2.1. Reaction of Stock Prices to Catastrophes

Hurricanes and earthquakes are destructive catastrophic events. They cause a large-scale destruction of individuals and property. These losses may be directly from the event or post event changes in regulations. Angbazo and Narayanan (1996) studied the impact of Hurricane Andrew and post event changes in the regulatory environment for 48 publicly traded property-liability insurance firms operating in the area. This study found a negative impact on all firm in the insurance industry, whether these firms have any exposure to hurricane affected area or not. In the case of Andrew, initially stock price did not fall sharply due to an expected insurance premium. Unfortunately, in Florida (and Louisiana), any premium related to Andrew was not allowed, that caused a rapid fall in stock price. Hurricane Andrew had a negative impact on stock prices irrespective of the level of reinsurance, but this response was (weakly) not as much of negative about the unexposed firms with abundant reserves. Shelor, Anderson et al (1992) studied the impact of California Earthquake or The Loma-Prieta earthquake on stock prices of insurance industry. They investigated two opposing hypothesis. The first is that losses

due to such catastrophic events lead to depletion of surplus accounts that will reduce the stock value, and other is that an expected increase in the demand of insurance will lead to increase in the value of stock of insurance firms. They found that earthquake affected stock price of insurance industry positively because investors forecasted an increase in demand for insurance. Valadkhani (2004) examined the impact of 42 natural catastrophes on the Australian stock market and documented that all types of natural disasters, for instance, cyclones, wildfires and earthquakes, have an influence on returns in the Australian capital market. They used Autoregressive moving average (ARMA) models to study the equity returns and for the addition of new information arrivals. By using data from 31-12-1982 to 01-01-2002 for AORD index, study reported the most significant impact of cyclones; earthquake and wildfires are on AORD index returns. Furthermore, these impacts are significant on the day of an event and few days after the event days.

Lamb (1998) studied the efficiency around the hurricanes, the hurricane Andrew and hurricane Hugo. Study found that market reaction was different in both cases. Firms were unaffected by Hurricane Hugo apart from their existence of exposure in North or South Carolina, while a negative impact of Andrew was observed in Florida or Louisiana on the firms having top positions in the industry. This study also reported that the ability of market to be discriminate between both hurricanes regarding their extent to which these firms were exposed to these hurricanes. This specifies that information produced by hurricanes suddenly incorporated in stock prices, and investors behaved rationally.

SÜER (2008) studied the impact of Mara-Mara earthquake on financial sector (Banks and insurance) companies listed in ISE (Istanbul Stock Exchange) by using event study

method. This study reported significant abnormal and negative returns just after the Mara-Mara earthquake. The return of banks was negative but the level of significance was less important. Findings of study reported that it is difficult to assume that market is efficient. Financial sector affected negatively but in one month, prices were recovered due to substantial increase. Shelor, Anderson et al. (1990) studied the stock market reaction after California earthquake. They concluded that earthquake transmitted new information in the market; as a result, the firms those were directly or indirectly related to real estate and operating in San Francisco bay area were more affected and stock prices decreased significantly. Jeremiah (2008) reported a significant fall in Asian stock markets due to slowing requirement of crude oil. It was due to Hurricane Gustav's movement toward Gulf Coast oil operations. This study also supports the Semi strong form of Efficient Market Hypothesis that any new information quickly incorporates in stock prices. Fink, Fink et al (2010) studied the impact of tropical storms on stock market, refined and crude petroleum products. They concluded that impact of storm on prices of refined and crude oil reflects in 24-hour. In a study, Xin-li (2010) studied the impact of May 12 Wenchuan Earthquake on China's Stock Market by using GARCH Model. Finding of study reported no significant impact of earthquake on the stock market.

2.2. Terrorism and Stock Market Reaction:

Terrorist attacks have a great impact on stock markets. These events may damage not only infrastructure but also the reputation of countries in the world that is not good for economic development of a country. In a study, Nguyen and Enomoto (2009) studied the impact of terrorist attacks on Karachi Stock Exchange of Pakistan and Tehran Stock

Exchange of Iran. This study investigated the impact of six terrorist attacks and one war The Iraq War of March 20, 2003 by using GARCH model and reported that due to 9/11 attacks both markets affected and five days after event returns in both markets decreased. Iraq war and attacks on USS Cole also decreased the returns in Karachi stock market. Due to these events, volatility affected significantly but a decrease in volatility reported due to decrease in trading activities. London Train bombing and attacks on Golden Masjid of Samrya in Iraq caused a decrease in returns in Tehran Stock Exchange. Pakistani Market affected more than Iran due to these terrorist attacks and Iraq war. It might be due to the reason that US and Pakistan are trading partners Pakistan exports more to US than Iran, so investors may expect in the reduction of profits of the company. Second reason may be the expected sanctions by other countries due to these events. A third reason might be the existence of more financial assets of Pakistan is at risk abroad than Iran.

Barros and Gil-Alana (2009) studied the impact of terrorism on the Basque country's stock market. By using long memory regression, study concluded that terrorism had a negative impact on the stock market; after a truce, the situation became normal, and increase in the terrorism lead to more negative returns. Barth, Li et al. (2006) concluded that terrorism effects growth of an economy severely. It described that Russia faced 0.97 terrorist attacks for population of one million in 2003. These statistics is associated with a 0.08 % point drop in growth of real GDP per capita. Many studies explore the reaction of national stock markets on extreme events, e.g. terrorist attacks, political events or natural disasters; especially, 9/11 has been studied by many scholars (Angbazo and Narayanan

1996; Blose, Bornkamp et al. 1996; Carter and Simkins 2004; Cam 2008; Brounen and Derwall 2010). Many studies investigated the impact of terrorist events specially 9/11 on different sectors. Yanase and Yasuda (2010) studied the impact of 9/11 on Insurance industry of Japan and found a negative impact on it. After two months of the event, a mid-sized property and casualty (P/C) insurance company, TAISEI Fire and Marine Insurance, became bankrupt on November 22, 2001, due to heavy reinsurance claims from the clients. In another study by Cummins and Lewis (2003) investigated the impact. Of 9/11 terrorist attacks and found a negative impact on the returns of insurance firms. An important insight provided by this study was that, it also distinguished among firms with weak capital and strong capital base. This study reports that weakly capitalized firms affected more than strong firms did. Strong firm's stock prices rebound only after one week of the event days, but the prices of weak firms did not rebound so quickly. Due to said event volatility in the stock market also increased. In a study, Wong and Lievano (2009) examined the impact of September 11 attacks on equity returns by testing the change in investor sentiment by using interrupted time-series analysis and ANCOVA. They reported significant change in investor sentiment and stock returns. In a study, Homan (2006) studied the impact of September 11 attacks on Marine Firms stock prices and systematic risk of these firms, and found a significant negative impact on returns and the systematic risk. This study reported that the portfolios having these firms in them also faced an increased Undiversifiable Risk of portfolio. In another study Homan (2009) the impact of 9/11 on Return and volatility of marine firms by using GARCH Model and reported an increased volatility and negative returns in post event era.

Carter and Simkins (2004) supported the notion of EMH, concluded that investors reacted rationally by differentiating stocks based on different aspects, e.g. US or Non US firms, level of cash and equivalent reserves and whether the airline was busy in airfreight business or passenger service. Guzhva (2008) studied the Impact of 9/11 attacks on airline industry and reported the significant statistical and economic effects of this terrorist attack on airline industry. Another finding is that more to the explanation of such effects may be explained by the inability of the traditional business model to Operate Profitably business, in such as difficult time diminishing the profits. This study also supports the study of Carter and Simkins (2004). Arin, Ciferri et al. (2008) investigated the impact of terrorist attacks on six countries, and documented that all markets affected significantly. However, stock markets of two countries (UK and Spain) less affected than other markets. This phenomenon explains the notion that investors in these countries are more resilient. Nikkinen and Vähämaa (2010) studied the impact of terrorist attacks, for instance, September 11, 2001 terrorist attacks in New York, the March 11, 2004 attacks in Madrid, and the July 7, 2005 attacks in London on the FTSE-100 index and documented that these attacks affected the-FTSE-100 indexes significantly and increased the risk significantly. The volatility due to these terrorist attacks was the highest for 9/11 attacks. Another finding is that investors predicted further sharp falls in FTSE-100 index. Ito and Lee (2005) studied the impact of 9/ 11 attack on demand for US airline. They reported a negative impact of 9/11 attacks on demand for air travel in US for more than 30 % for a short-term period than pre-9/11 incident. Another part of drop of 7.4 % is unexplained by recurring, seasonal or other factors, etc. Drakos (2009) investigated the

impact of terrorist attacks on stock markets of 22 countries during the period of 1994-2004. By using flexible version of World CAPM that allows for ARCH, study reported that terrorist attacks might cause significantly low returns on the day of an event. The consequences increase as a psychological impact goes up. From these studies, it is concluded that terrorist attack has an impact on the country in which this event has occurred, but other countries too suffered due to these attacks. In another study, Maillet and Michel (2005) reported similar findings about the impact of 9/11, 2001 on French stock market. It developed a new measure of risk for such extreme events; it was like a Richter scale. Study concluded that September 11 2001, affected French stock market more significantly than Asian and Russian crises. Charles and Darné (2006) studied the impact of September 11 terrorist attacks on 10 international stock markets and found that terrorist attacks markets were affected stock market returns negatively. These shocks affected the normality of returns. When omitted these outliers from data was normal for nine markets out of ten markets under study. In a study, Niederhoffer (1971) examined the impact of different extreme events from President Kennedy's murder to the War of Korea. It reported significant negative impact on average returns of stock prices. Chen and Siems (2004) investigated the impact of 14 Terrorist/ military attacks from 1915 to the recent events of Iraq war and September 11, attacks on capital markets of United States by using event study method. They reported that current US stock markets are more resilient than past times and rebound quicker than other countries, having an impact of such as the terrorist// military attack. It might be possible due to a better banking system that may provide liquidity to US markets to stabilize. Findings of the study also

recommended regulators around the world to share information in order to prevent bad effects of such a type of extreme events, because international markets are inter-related. They explained that this need of information sharing is due to media revolution quickly propagation of any news in the world is possible, especially bad news propagate so quicker than good news. A question may arise that what type of information can be shared? This information may be titanic dollar transaction or remarkable trading of shares. These might be caused of the disastrous situation anywhere in the world. So strong and quick information sharing mechanism is necessary.

Some terrorist attacks can affect industries at different levels some industries can be directly and highly affected but some have no direct and significant impact. Cam (2008) studied the impact of 9/11, attacks. Bali attacks and Madrid bombing by using event study method on different industries in US. Some industries suffered from losses while some industries earned profit. After 9/11 attacks industries like airline, gamble, entertainment, and transportation industries faced a worse decline in prices while in some other industries, results were opposite, e.g. the water supply, defense, and telecommunication industries enjoyed prices increase. After Bali attacks and Madrid, bombing some industries suffered a decline in price. Some industries that were affected after 9/11 attacks were also suffered due to other two events. Charles and Darné (2006) investigated the impact of September 11 attacks, by using data of ten stock markets indices, by applying outlier Detection Method. Due to this attack and its consequences, international stock markets faced great shocks. Study reported that US and international markets have a strong negative impact of outsized shocks. These shocks are outliers and

can affect the normality of coefficients. If outliers are corrected this behavior of non-normality can be decreased. Chesney, Reshetar et al.(2011) Studied the impact of terrorist events occurred in 25 countries during the period of 11 years: by using three different methodologies including event study method, a non-parametric method and GARCH-EVT. This study investigated terrorist events with other types of extreme events, including natural catastrophic events and financial crashes, etc.

Ramiah, Cam et al. (2010) investigated the impact of five terrorist events on Australian stock market. These events include 9/11 attacks, London, Madrid and Bali bombing, and Mumbai attacks. By using parametric and non-parametric techniques, concluded that 9/11 attacks have a strong negative impact on Australian stock exchange. Most of the industry sectors affected due to this attack. About, 40 % industries were under the negative impact after five days.

The analysis of three different methods supports the use of Non-parametric method to study the impact of terrorism on financial markets. They concluded that about two out of third terrorist attacks significantly affected the markets. Swiss market affected due to more terrorist attacks than US markets. Sector wise analysis reveals that airline and insurance industry are more sensitive than other sectors and these types of events insignificantly affect banking industry. Other industries, e.g. pharmacy/biotech, defense/aero oil and gas sectors showed mix results. In case of a natural disaster, these markets have similar behavior. Brounen and Derwall (2010) studied the impact of terrorist attacks on international financial markets. They found significant economic and statistical impacts. The average price reaction since 1990 was about -0.34 % that is equal

to annually 134 %. An important thing is that if 9/11 event is excluded, and then these events lose statistical significance. An analysis of terrorist events was also done and found that except 9/11 attacks, and few terrorist attacks have significant price reaction was felt few days after the day of an event. Empirical studies as well revealed that the reaction varies from country to country and sector to the sector. Industries facing these attacks directly suffered due to large losses. It is important that September 11 attacks have shifted the systematic risk in financial markets. This led an increase of beta in different industries. Brounen and Derwall (2010) studied the impact of terrorist attacks on international financial markets by using Event Study Method and found a negative impact of these events on global stock markets. The study also reported that after terrorist activities, stock markets rebounded about after a week excluding the 9/11 attacks. In the terrorist events under study if we exclude the impact of 9/11 attacks on the stock market the results should be weak, that describes the severity of 9/11 attacks. This study also reports that most of the terrorist attacks have an one-day impact on the market that is the day of event occurrence. This study as well reports that those industries affected more due to the attacks those directly affected due to these attacks. Due to 9/11 attacks, the systematic risk of the market increased significantly. September 11 attacks also have an impact on Pakistan. Impact of 9/11 on Karachi Stock Exchange, Forex Market and Inter Bank Market is investigated by Gul, Hussain et al. (2010). is study used OLS regression, and found a negative impact of terrorist activities specially the 9/11 attacks on these three markets. Terrorist attacks can affect markets other than the attacked nation.

2.3. Nuclear and industrial accidents/ Nuclear test

Fields and Janjigian (1989) studied the impact of Chernobyl nuclear-power accident on utility prices of nuclear utility firms. The study concludes that utility firms suffered 20% decrease in stock price. Nuclear Firms stock price decreased more, than non-nuclear firms did. This study supports the results of three miles nuclear accident's results. Hill and Schneeweis (1983) studied the Three-Mile Island accident. They studied nuclear and non-nuclear firms had documented different impact on nuclear and non-nuclear firms. This study concludes that nuclear firms were more affected than non-nuclear utility firms were. Authors found the investors demanded more risk premium for Nuclear based utility firms than non-nuclear utility firms.

Kalra and Henderson Jr (1993) studied the impact of Chernobyl nuclear accident on US utility firm share price using event study method. They created three different portfolios consisting of nuclear firms, mixed firms (having 20 % nuclear capacity) and non-nuclear firms. They found an overall negative reaction of market while US based nuclear and non-nuclear utility firm share price affected less extent. The main negative impacts felt on mixed capacity utility firms that have up to 20 % atomic capacity. Other implications include that Investors interpreted correctly that, this is a start of new age for nuclear industry in United States, and the stock market rapidly acknowledged the consequences for service stocks. Another reason of this level of reaction on atomic utility firms based on some differences between design and management between US nuclear facilities and Chernobyl. Maloney and Mulherin (2003) studied the speed and accuracy of price discovery by investigating stocks returns and volume of shares traded around the crash of

space shuttle challenger. They explained that price discovery occurred without any large trading gains. Much of price discovery occurred during a time when trading was closed. Here, it is very important that investors processed the information quickly and accurately, and they identified the culprit firm rapidly. Industrial accidents are also a part of events that may have a negative impact on stock price of stock and value of the firm. Blose, Bornkamp et al. (1996), using event study method, explored the impact of Space Shuttle Challenger explosion on the stock market and specially the NASA contractors. On the day of an event, the stock prices of seven NASA contractors fall. The impact was restricted to only NASA contractors. A very interesting thing is that market identified very quickly that the only single firm that affected by this crash is Morton Thiokol Corp. In a study by studied the impact of 64 chemical accidents from 1990 to 2005 on the stock market and found that one-fourth of such accidents caused a toxic release and at least one person died or seriously injured in each event. After this Market value of the firm dropped by 1.3%. Aktar (2005) studied the impact of three-mile incident and Chernobyl incident on stock prices of each firm. Sweeney and Zhang (1999) studied the impact of Pakistan and India's nuclear tests on stock markets of Pakistan, India, China and G-10 countries by using Event study method and found that overall cost of these test to Pakistani stock market is 27.41 % by which Pakistani stock market fell. Due to Indian test. Pakistani market fell 10.59 % while in response to Pakistani nuclear test Pakistani market fell lesser than Indian nuclear test while China lost its 3.93 % of wealth. Politicians of both countries think that markets are showing an overreaction, so they are not giving importance to these signals. These tests affected not only Pakistan and India

but also China that supported Pakistan heavily in nuclear program and Missile technology. This caused 6.33 % decrease in Chinese's wealth. China suffered from these tests more than G-10 countries, while G-10 countries did not affect significantly. Same consequences reported by (By Jonathan 1998), says that after nuclear tests, Bombay Stock Exchange fell 2.1%, Blue chip sensitive index of Bombay stock exchange decreased by 6.1 %, which recovered after some rumors that government will support to make the situation better. After Indian nuclear tests, Indian Rupee dropped by 7 %, while Bombay Stock Market lost its one-fourth value in the result of nuclear test by India. In a study, Attiya and Ayaz (1999) studied the impact of Indian and Pakistani nuclear tests on KSE. They reported that Indian nuclear tests affected Karachi Stock Exchange negatively but there was not a significant impact of Pakistani nuclear test on Karachi stock exchange. Although results were insignificant, but these tests increased volatility the stock market. One possible reason is that these tests were expected so this expected was priced by market already. By Sara (1998) reported on Wednesday after the second round of Indian nuclear test series the benchmark index of Indian market decreased by 4 % and US imposed sanctions on India. Bombay 30 –stock index fell by 6 % after the nuclear test began in start of the week. Peter (2006) reported that US markets has learned to stop fearing from geopolitical events. He compared London train bombing and Israel-Hezbollah conflict with nuclear test of North Korea and concluded that US markets reacted less in case of North Korea's nuclear test. He also reported that the neighboring South Korea affected negatively, and its stock market fell by 2.4 % (that is six weeks lowest). Same results are reported by James and Chris (2006) who says that South

Korean market fell by 2.4 % the six weeks lowest. This will increase the risk premium required by investors. For some companies e.g. Hyundai Merchant Marine, who operates tours for North Korea, fell 15% that is the daily limit, Electronics multinational LG Electronics decreased by 2.4%, while Hynix Semiconductor dropped down by 4.2%. Anonymous (2009) reported the impact of North Korean underground nuclear test - conducted on Monday- on Asian stock exchanges and mentioned that some markets affected negatively, for instance, on Tuesday trading South Korean market dropped by 1 %, Japan by 1.2 % and Australia by 0.3 %. While on Monday, Seoul the Korean stock market fell by 6.3, recovered soon, and closed at 0.2 % less at 1400.90.

In a study, Dillon, Johnson et al. (1999) investigated the impact of an air line crash on the firm affected by a crash and the Aviation and Aerospace industry. They investigated the impact of 10 most fatal crashes occurred in US Aerospace and Aviation industry. They reported that investors differentiate between the expected risk related to a firm and unexpected risk related to a firm. If an event occurs, that is included in the expectation of investors than it will not change the investor attitude. If a firm faced an event that is unexpected than investors may change their behavior and changes their expectations regarding a firm that will lead to change in demand and supply of shares of that firm. Walker, Thiengtham et al. (2005) studied the impact of aviation disasters on airline and airplane manufacturer firms. They applied event study method to measure the impact of aviation disasters on US aviation and Airplane manufacturer firms. Due to the disasters, airlines faced an average 2.8 % drop in stock prices within one trading day after the event. While the impact of such an event on airplane manufacturers was on average

was 0.80 % after the event. Factors causing the decline in stock are company specific and industry specific. A negative relationship found between size of the firm and number of fatalities resulted due to the disastrous event. The event of 9/11 is the most influential than other events. Due to 9/11 event observed a significant negative impact (Suhardjo 2001).

2.4. Political Events

Political events of different types have the different impact of stock market behavior. Nimkhunthod (2007) studies the impact of different political events, for instance, elections, dissolution of parliament, riots and military takeovers or imposition of Martial law. The impact of election is positive on the equity market for the longer period; military takeovers have a negative impact on the market for a short time period but good impact for a long-time horizon. In the case of riot, market reacts forcefully; it is observed that good news is under estimated while bad news is leveraged the negative impact.

According to literature, value of a firm calculated by calculating the present value of expected free cash flows from its operating activities. Here, the discount rate is the subjective required rate of return of investors. If there is, a political uncertainty investor will increase their required rate of return due to an increase in the political risk. Especially foreign investors are more interested in the stable political environment. We can say that a stable political environment is good for economy than an unstable and fragile political situation. Another important factor is that emerging economies are more sensitive to political events than developed economies. In a study Diamonte, Liew et al. (1996) concludes that political risk is an important factor that has a more impact on a

developing economy than developed economies. Economic and political news also has an impact on the stock market. Chan, Chui et al. (2001) reported that political news has a different impact on the stock market than economic news. In a study by Schwert (1989) concludes that the great volatility in stock market returns in the time of great depression during (1929-1939) was due to the political uncertainty about the survivability of capitalism in the united states. People were uncertain that capitalism might be able to survive after this great depression. Hellström and Sultanaeva (2010) studied the impact of political stability on Baltic stock markets and found that with increased political stability, volatility in Baltic markets has reduced although increased political risk in Russia has increased the volatility in Baltic Stock markets. Lin and Wang (2007) studied the effect of party alternatives on Nikkei-225 index and found an insignificant return volatility for transition of governing party. During this study period 19 prime ministers were elected, 16 prime ministers were Liberal Democrats, and only 3 were other party prime ministers. In a study by wang et al, (2008) studied the impact of political changes on US, Japanese, British and French stock exchanges for short term and long term time horizon. They concluded that political changes have a negative relationship with stock market returns. International political events have an impact on local stock market. Fowdar and Koonjal (2008) studied the impact of political and economic events on Mauritius stock exchange. They reported that political and economic, both events have an impact on stock prices but political news has more strong impact on stock prices than economic news. International political events have an impact on local stock market.

Herron, Lavin et al. (1999) investigated the impact of politics on different

economic sectors in US and not found even a single sector that is insensitive towards politics. In the analysis of defense industry author found that, firms with large projects supported by government expected to earn the profit. The firms, which were engaged in large projects, but not supported by government, were not supposed to earn the large profit. In the study of firm's emitting heavy toxic waste were expected to suffer. Some sectors, for instance, Pollution control and aerospace and defense were seen as government supported and some sectors, namely, were both found to be government supported, and some sectors, for example, pharmaceuticals and cosmetics/personal care were ignored by government.

Döpke and Pierdzioch (2004) studied the impact of the political process on German stock market and found a weak impact of the political process on stock market returns. In contrast to US, in Germany no evidence found of election on stock market returns. Bialkowski, (2008) studied the impact of national election around election dates in return of 27 member countries of OECD. They found increased volatility in the index that may be due to uncertainty about the election outcome. If competition in election is one on one market will be more volatile. An important finding is also that markets with short trading history are more volatile. Mehdian, Nas et al. (2008) studied the impact of unexpected political and economic news on Turkish stock market for the period 1997 to 2004. They reported that there was no significant impact of the price reversal process after the extreme events, which overreaction hypothesis predicts. Study also found that price remained below its fundamental value when any new unexpected political or economic news arrives in the market. Any new information favorable or unfavorable

increase's volatility in the market (Chen, Bin et al. 2005). In a study Clark, Masood et al. (2005) studied the impact of political events (from 1947 to 2001) on Pakistan's stock markets. by using Markov Chain Monte Carlo (MCMC) Techniques and Bayesian modeling. They concluded that the chance of occurrence of a Political event has increased about 1.5 % in each subsequent year. In this analysis, they did not find any evidence of the increase in the frequency of events, and the rate is the same but probability of occurrence increased.

2.5. Stock Market returns Volatility:

Literature uses the term "volatility" for the variation in prices of assets. In finance, volatility may be viewed in different aspects in the different area of finance, for instance in portfolio management volatility is the risk of portfolio, and this helps to estimate sufficient required rate of return. In the area of risk management, it helps to compute the value-at-risk (VaR) that helps the organizations to maintain the sufficient level of capital reserves. Volatility is the Standard Deviation of stock return distribution. Financial time-series data exhibit fat tail's behavior. These observations in the tails describe different extreme events, for instance, financial crashes and terrorist attacks; etc Zhou. (2007) Volatility in stock market returns has received sufficient attention of practitioners and scholars. Volatility in returns of stocks represents the irregularity of stock price changes throughout a specific period. This is a gauge of risk, which shows the riskiness of investment in a specific region, market or in a specific security. Any error in the forecast of volatility will result from a bias on pricing of an asset. This bias may cause an inappropriate investment decision. It is used by policymakers as a barometer of the

exposure of financial markets (Karolyi 2001). The Volatility of stock market returns is an issue of interest of scholars since 1970. It has been studied in emerging and developed markets to understand the causes and results of volatility (Mollah 2009). In a study, (Poon and Granger 2003) concluded that volatility is an important aspect of stock market development that provides input for management of asset portfolio and also helping for market regulators. Another important thing is that International markets have different volatility patterns (Roll 1992; Aggarwal, Inclan et al. 1999; Bekaert, Harvey et al. 2001; Xing 2004). Volatility has two types one is expected volatility and second is unexpected volatility. In a study Chiang and Dong, (2001) investigated Expected and unexpected volatility. they studied seven Asian markets in which they investigated the relationship among stock returns and unexpected volatility and reported that in four out of seven markets, the relationship is significant, in other words unexpected volatility is more significant than the expected volatility. They also reported a strongly significant asymmetry of volatility. In the case of low frequency data, the effect of asymmetry will disappear.

Park (2002) studied the asymmetry of returns in six different stock markets, including S&P 500, TOPIX, FAZ, FT100, FT100, CAC40 and MIB by using quintile regression. He reported that only TOPIX has a moderately level of asymmetry of volatility among six stock markets. Except the returns of FAZ and FA100, all other markets have significant asymmetry in volatility at higher level. Another finding is that TOPIX, CAC40 and MIB have leverage effect. It means that these markets respond on negative extreme shocks more than positive extreme shocks, while when a positive shock

occurs, it has no correlation with volatility. This thing explains that the effect of leverage is stronger at the time of negative shocks or in difficult time. In some other studies, Leverage effect has been found significantly, For instance. Ayodeji Ayodeji (2009) studied the relationship among stock returns and volatility by using E-GARCH-in-mean model in Nigerian stock market and reported a significant relationship between returns and volatility in stock returns and a positive relationship between risk and return.

Glosten, Jagannathan et al. (1993) studied the relationship between expected value and volatility of the nominal excess return on stocks. They reported a negative relationship among conditional variance of the excess returns on share and the conditional mean. This relationship can be more strongly significant if conditional variance can be deterministic monthly seasonal and to depend on nominal riskless interest rate. Apergis and Eleptheriou (2001) investigated the volatility in Athens stock exchange during the period of 1990-99 by using quadratic GARCH; they reported asymmetry in returns of Athens stock market. For investigation purpose, used different models but the GQARCH (1, 2) model was the better predictor of volatility in returns.

Baillie and Ramon (1990) studied the volatility in returns of Athens stock exchange by using quadratic GARCH and found a significant level of asymmetry in returns in Market. Hussain and Uppal. (1999) studied the KSE that is Pakistani stock market by using GARCH (1.1) and found that volatility in KSE is predictable. Another important issue regarding volatility is its propagation through markets due to extreme events. In a study, ChuliÁ, Climent et al. (2009) investigated the volatility propagation between European stock markets and united states. In this study, they investigated the

impact of September 11, March 11 attacks impact on volatility transmission between Europe and US. By using multivariate GARCH model, they confirmed that in both market's asymmetry of volatility is in both markets. This volatility is bidirectional in nature of propagation. September eleven attacks on New York affected the volatility in Euro zone stock exchange but terrorist activities of London train bombing and Madrid attacks did not affect volatility in US stock exchanges. The reason behind the difference of both stock markets' reaction according to Johnston, and Nedelescu (2006) might be that, 9/11 affected several sectors of markets, including banking, tourism, insurance and aeronautical sectors. If we compare the impact of nine eleven, it is significant but in case of other attacks, these sectors not affected significantly. Another explanation might be that Madrid attacks were the regional issues while the September attack was an international issue. Third reason can be the time when these events occurred, Madrid attack was occurred at the time of economic growth while September 11 attacks were at the time of the economic downturn. Hammoudeh and Li (2008) investigated the sudden changes in volatility in five Arab stock markets. This study used iterated cumulative sums of squares (ICSS) to investigate the estimated persistence of volatility of returns during the period of 1994 to 2001. According to this study, these five markets are more sensitive about major international events than regional events and factors for example Asian crises of 1997, oil price collapse of 1998 and September 11 attacks. Capelle-Blancard and Couderc (2008) studied the impact of different types of event news on defense industry. To investigate this phenomenon, study used the event study method, 58 publicly traded defense-related firms were under investigation. The period of the study was 1995 to

2005. In the first step, separated the firms with abnormal returns, then the impact of different events or news was tested. It is reported that news having an impact on the price of other industries also affects defense industry approximately in a same fashion. Another thing is that there is some evidence of profit motivated private information that also affects stock prices. Some ways in which defense industry has some specific volatility factors, for instance, announcement or rumors about bid announcements that may cause about 15 % of stock price volatility. Second factor is public spending of defense, also play an important role in the prices change. Any news that is about defense-related contracts also changes price of industry stock price. The third factor is geopolitical events: these events also play an important role in volatility of stock prices. It was also concluded that all defense-related firms suffered due to these events. For example, September 11 attacks primarily correlated to the armed and civil activities in each firm.

Volatility Modeling:

Volatility modeling is a major interest in financial research. Many scholars, for instance, Poon and Granger (2003); Agan,(1996) made the comprehensive survey regarding the volatility modeling. There are four main approaches of volatility modeling, including, Historical volatility, Stochastic Volatility, ARCH Based Models and implied volatility. Historical volatility approach is a method, in which time-series data is used. In the absence of options of an asset or they are not traded regularly this method can be used. Bollerslev (1986), studied that conditional variance of return may depend on past squared returns. The other approach is derivatives used for volatility modeling. Suppose the option of an underlying is in trade regularly and frequently, so we can use option

price. Then by using a proper option-pricing model for instance, Black-Sholes Options Pricing Model may be useful to uncover the volatility of an underlying asset. To test the impact of extreme events the traditional method is event study method that is widely accepted and used in research for instance (Kalra and Henderson Jr 1993; Blose, Bornkamp et al. 1996; Sweeney and Zhang 1999; Cam 2008; Capelle-Blancard and Laguna 2010), e . Another methodology is filtered GARCH-EVT used by Chesney, Reshetar et al.(2011) In recent years, some scholars argued that another nonparametric methodology of Quantile Regression might be useful to study the impact of extreme events (Zhou, 2007; Huang, 2011). Quantile Regression is a Non-Parametric method that is a robust methodology. Some studies, for in instance, instance Huang (2011) argued that the impact of extreme events for instance financial crashes and terrorist events such as 9/11 can be quantified by using Quantile regression.

Quantile regression is a new approach to forecast volatility. This approach was developed by (Koenker and Bassett 1978), new and advance technique, which is different from Normal or Gaussian distribution. This technique extends the concept of location based ordinary Quantiles to linear model where conditional Quantiles have a linear form. By using Quantile regression (Straetmans, Verschoor et al. 2008) studied the impact of 9/11 attacks on indexes of different industry sectors. This study reported that due to 9/11, attacks lower side of risk and upper side of potential increased the risk of many sectors. In this study, we will extend the use of Quantile Regression in the study of impact of extreme events on the stock market.

2.6. Hypothesis

Extreme events have a significant impact on stock market returns.

TH 9847

CHAPTER 3

3.1. RESEARCH METHODOLOGY

In literature, the following methods are available to investigate, the impact of extreme events.

- i) Event study method (AR, CAR model)**
- ii) GARCH Model**

This study use, Quantile Regression, developed by Koenker and Bassett (1978). We are using it to test the impact of extreme events on stock market's indexes, and risk return relationship in Karachi Stock Exchange.

In Quantile regression nine quantiles (0.1, 0.2, 0.3, 0.40.9) are used. Quantile Regression focuses on the quantiles of a given dependent y given independent X rather than the conditional mean of dependent y given independent x . By using different quantiles we can investigate the whole distribution rather than only mean, which shows a complete picture.

Data description and Methodology: Use of Quantile Regression

3.1.1. Data description:

In testing the impact of extreme events on stock market volatility, we use daily-adjusted closing index of Karachi Stock Exchange (KSE) 100 indexes for six months pre event and six-month post event data are used to explore the volatility and return behavior. However, standard deviation is calculated for three-month data before pre event period.

- Daily index returns calculated from the KSE-100 index by using following formula.

- $$R_t = \ln\left(\frac{P_t}{P_{t-1}}\right)$$

3.2. OLS Regression Model

The Following is the model and explanation for OLS Regression Model.

$$Re = \alpha + \beta_1\sigma + \beta_2D + \mu$$

σ = Standard Deviation/ Volatility of Return (independent Variable)

α = Alpha Coefficient

β_1 = Beta Coefficient of Variables

R = Expected Return (dependent Variable)

D = Dummy Variable (Affected day = 1, Non affected day = 0)

μ = Error term

- Calculated Standard deviation of index returns is by using 3 month before the pre-event period.
- Then, 03-month standard deviation converted in daily standard deviation to match it with daily return.
- Used Dummy Variable to test the impact of event

3.3. Model: Quantile Regression Model

The following is the model and explanation for Quantile Regression Model

$$R_e = \alpha + \beta_1 \sigma_{Q_n} + \beta_2 D_{Q_n} + \mu$$

σ = Standard Deviation/ Volatility of Return (independent Variable)

α = Alpha Coefficient

β_n = Beta Coefficient of Variables

R = Expected Return (dependent Variable)

Q_n = Quantile no

d = Dummy Variable (Affected day = 1, Non affected day = 0)

μ = Error term

3.4. The following events are under study:

Sr. No	Date	country	Incident	Reason for inclusion
1	28-05-1998	Pakistan	Pakistan Nuclear Test	Major international Event
2	11-05-1998	India	Indian nuclear test	Major international Event
3	12-10-1999	Pakistan	Takeover by Musharraf	Major Political Event of Pakistan
4	11-09-2001	US	World Trade Centre New York attacked	Major international Event Major Trading Partner
5	13-12-2001	India	India parliament New Delhi bombed	Major Economic power in the Region
6	07-07-2005	UK	London Train Bombing	Major International event
7	08-10-2005	Pakistan	8 October, 2005 Earthquake	Great catastrophic event
8	03-11-2007	Pakistan	Emergency Proclamation by Musharraf	Major political Event of Pakistan
9	27-12-2007	Pakistan	Benazir assassination	Major international Event
10	18-08-2008	Pakistan	Musharraf Resign	Major Political event of Pakistan
11	11-03-2011	Japan	Tsunami & Nuclear Meltdown	Major international Event
12	21-08-2008	Pakistan	Suicide Attacks	First suicide attacks on a secure Pakistan
13	02-05-2011	Pakistan	Osama Bin Laden Assassination	Major international Event
14	26-11-2008	India	Mumbai Attacks	Major Economic power in the Region Historical relation Enmity between Pakistan & India Threat of War

Table 1 Events Included in Study

3.5. Introduction to Events under Study

3.5.1. Pakistan Nuclear Test 28th May 1998

On May 28, Pakistan detonated five nuclear devices in response of Indian nuclear tests. This was a reaction to Indian nuclear tests during same month 11 to 13 May. U.S and other western countries tried to persuade Pakistan to exercise restraint and forgo testing. In June 6, UN, Security Council adopted a resolution No. 1172 in which India and Pakistan were called to refrain from more tests and restart the dialogue on Kashmir dispute. The US and other western countries imposed economic and military sanctions on both countries. Later in October, these sanctions were eased under India –Pakistan Relief Act.

3.5.2. Takeover by Musharraf:

October 12, 1999 – General Pervez Musharraf takes power following a bloodless coup after Prime Minister Mr. Nawaz Sharif dismissed General Musharraf while the general was on his way back from Sri Lanka. The country was virtually bankrupt, and the coup was relatively popular. Government sent Mr. Nawz Sharif into exile a year later after a deal with government.

3.5.3. 9/11 Attacks:

On September 11, a series of coordinated suicide attacks by Al-Qaida among those the most dangerous was WTC attack. This was a new type of attacks, in which Al-Qaida used four commercial passenger jets as a weapon of destruction to achieve objectives. The hijackers crashed two jets into twin towers of the world trade Centre. Both buildings collapsed within two hours. About 2973. victims lost their lives. After the attacks, heavy

economic losses suffered by US economy. Subsequent to these attacks, US started the so-called war against terrorism, which affected the whole world.

3.5.4. Attacks on Indian Parliament 13-12-2001

On 13, December 2001, five gunmen entered the Indian Parliament House in a car with fake Home Ministry and Parliament labels. While both parliaments, the Rajya Sabha and Lok Sabha had been suspended forty minutes prior to the incident, many Members of Parliament (MPs) and government officials such as Home Minister LK Advani and Minister of State (Defense) Harin Pathak were believed to have still been in the building at the time of the attack. Prime Minister Atal Bihari Vajpayee and Opposition Leader Sonia Gandhi had already left). The terrorist smashed their motor vehicle into the car of the Vice President of India Mr. Krishan Kant (who was in the building at the time), got out, and start firing their weaponry. Five police force officers, a gardener, a Parliament security guard, and 18 others people were also hurt. No members of the government were hurt in these attacks. India claimed that these terrorists were Kashmiri militant groups (backed by Pakistan's intelligence agency the ISI), e.g. Jaish-e- Mohammad, Lashkar-e-Toiba and Maulana Masood Azhar. After this incident tension heightened in Indo-Pak relations, and armies of both countries became high alert.

3.5.5. London Train Bombing

In the July 7, 2005 terrorist attacked in London, also known as 7/7 was a series of coordinated suicide attacks on London's public transport system early in the morning during rush hour. In the attacks, four British Muslim men were involved. Three of them

were Pakistani, and one was Jamaican descent. They were against Britain's involvement in the US led Iraq War.

In these attacks, three bombs exploded within fifty seconds of at 08:50 am in London Underground trains. After an hour, exploded the fourth bomb 09:47 am in Tavistock square on a double-deck bus. In these attacks, 52 people killed and around 700 wounded in these attacks.

3.5.6. Earthquake 8 October 2005 Pakistan

In Saturday morning of October 8, 2005, an enormous earthquake struck three countries including Pakistan and parts of India and Afghanistan. This earthquake was the most destructive disaster in the region. According to reports close to 80,000 people killed and at least 50,000 more injured in the affected area, mostly in northern areas of Pakistan, and in the Pakistani-controlled Kashmir, in the Indian occupied Kashmir, and in Northern India. Three different metrological stations recorded this earthquake; the magnitude was 7.5 by Pakistani Metrological Service, 7.6 by U.S. Geological Survey, and 7.8 by Japan Meteorological Agency. A final approximate of the magnitude of the earthquake is 7.7. After the earthquake, more than 20 aftershocks hit the area in 18 hours after the major shock. The range of magnitude was from 4.5 to six.

3.5.7. Emergency Proclamation by Musharraf November 3rd, 2007

In November 3, 2007. President. Musharraf announced the state of emergency in Pakistan. It lasted until December 15, 2007, suspended the constitution of Pakistan. Chief justice Supreme Court of Pakistan declared that the emergency is an illegal act. He also ordered the armed forces of Pakistan not to obey any illegal orders. Later Musharraf expelled Chief Justice from his office. On November 28, 25 days after the emergency.

Musharraf resigned as army chief. The Triple one brigade of the Pakistan army entered the Supreme Court building and removed Chief Justice Mr. Iftikhar Ahmad Chaudhry and several other judges from the Supreme Court and arrested them.

3.5.8. Benazir Assassination:

On 27 December 2007, in an attempt Ms. Benazir Bhutto killed in Liaquat Bagh, Rawalpindi, Pakistan. MS Bhutto, elected as Prime Minister of Pakistan twice (1988–1990; 1993–1996) and then-leader of the opposition Pakistan People's Party, She assassinated during the campaigning before the elections due in January 2008.

3.5.9. Musharraf Resigne

On August 18, 2008, President, Musharraf announced in a television address that he would step down as the president of Pakistan. He said that, I do not want the Pakistani people go into uncertainty; I have decided to resign as a President. He came into government after a military coup against Prime Minister Mr. Nawaz Shareef in October 12, 1999. He resigned after nine years of his military takeover against civilian government.

3.5.10. Mumbai Attacks:

On November 26, a group of terrorists attacked on Mumbai in different places. Terrorist attacked in 10 different places in Mumbai, consisting of shooting and bombing attacks across Mumbai, the largest city of India. According to Indian claims, these were Muslim terrorists operated from Pakistan. All over the world, India got support from people and leaders of different countries. The attacks began on 26 November 2008 and lasted until 29 November. India claims due to the attacks 207 killed and wounded 714 people.

3.5.11. Osama Bin Laden Assassination

May 02, 2011 the top leader of Al-Qaeda Osama's bin Laden killed on Sunday in the military area in Abbotabad about 50 kilometers north of the capital Islamabad.. Pakistan in a shootout with US Navy Seals. After these attacks, US-Pakistan's relations became very tense. People of Pakistan and Pakistan Army took it the violation of the sovereignty of the country.

3.5.12. Suicide Attacks on Pakistan Ordnance Factories

In August 21, 2008. two suicide bombers exploded themselves in front of two gates of Pakistan Ordnance Factories (POF) in Wah Cantt, Pakistan. In these attacks, at least 70 people killed and more than 100 people wounded, was the most hazardous attack on an important military site in history of Pakistan. Before this event, military areas were the safest place in the country.

The Pakistan Ordnance Factories (POF) in Wah Cantt, Pakistan is the very important center of the country's defense industry. Pakistan Ordnance Factories produces traditional arms and ammunition for Pakistan Army. Almost 25,000 workers are working there to produce explosives, weapons, other conventional arms, ammunition, and some commercial products.

3.5.13. Earthquake and Tsunami in Japan

On March 11, 2011, a massive earthquake jolted Japan at 14:46 JST (05:46 UTC). The magnitude of the earthquake was 9.0 on Richter's scale. The quake hit at 2.46 pm Japan time (5.45am GMT), about 6 miles below sea level and 78 miles off the east coast. In Tokyo, people screamed and grabbed each other's hands as it struck. The shock was so

powerful it was felt as far away as Beijing. Japan's most powerful earthquake since records began has struck the northeast coast, triggering a massive tsunami.

A wall of water swept cars, ships and buildings away after the 9-magnitude tremor, which struck about 400km (250 miles) northeast of Tokyo.

According to National Police Agency of Japan 14,755 died, 5,279 injured and 10,706 people, missing across 18 prefectures, as well as over 125,000, buildings damaged or ruined.

3.5.14. Indian Nuclear test 11th May 1998

India detonated its nuclear devices on May 11 to 13th 1998 Pokhran. India first detonated its nuclear device in 1974, after this Pakistan also started its nuclear program for its protection. After these test of India, Pakistan finally detonated its devices on May 28 1998. After these test KSE dropped by 421.24 points in 13 days after Indian detonation. Indian test increased tension among these neighboring countries.

CHAPTER 4

Results and Discussion

4.1. October 8th 2005 Earthquake

Figure 1 exhibit the returns distribution around the earthquake of October 8, 2005. Returns do not changed significantly and Figure 2 exhibits volatility behavior, which show no significant shift in volatility, so an advance technique is needed to study the impact of this event.

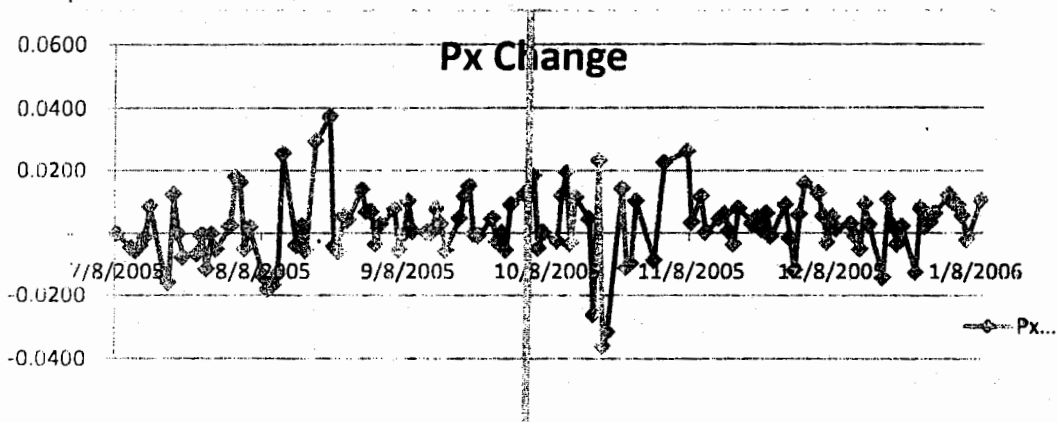


Figure 1 Return October 8th 2005 Earthquake

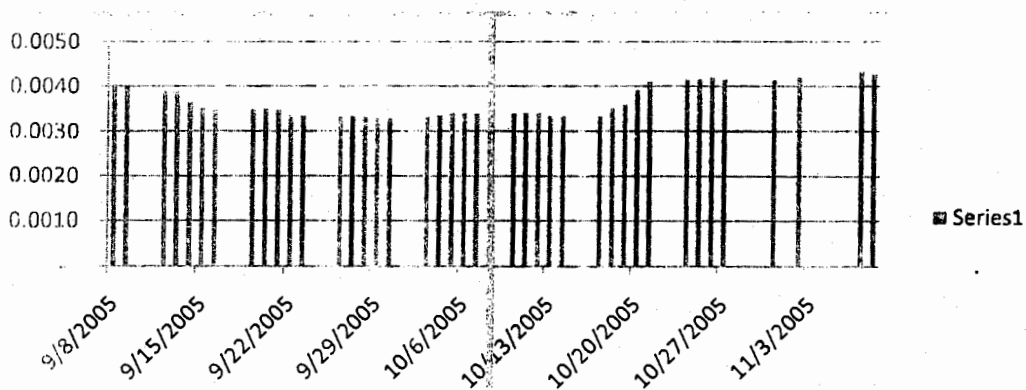


Figure 2 Volatility, October 8th 2005 Earthquake

Table 2 represents the results of OLS Regression as well as Quantile Regression. OLS Regression results indicate that there is an insignificant relationship between return and standard deviation. It shows that the earthquake of October 2005 has an insignificant risk return relationship in market. However, Quantile Regression indicates that risk, and returns have a significant negative relationship in lower Quantiles. It means that any increase in volatility leads to decline in return in lower quantiles, whereas increase in volatility leads to increase in returns in upper quintiles. It means an increase in volatility reduced the returns during low earning periods, and this relationship is not consistent with the economic rationale and speaks of inefficiency of market. A possible reason of negative relationship between risk and return is that when this information about earthquake arrived in market, it created a knightian uncertainty in market and investors were unable to make right decision, so risk return is negative. Upper quintiles indicate a high-risk and return relationship, which is in line with economic theory, but the relationship is insignificant. However, Market volatility remained lower after this event.

Dummy variable is insignificant in OLS Regression while in Quantile Regression middle and upper quantiles are significant negative. It shows that during medium and high earning period stock market returns affected negatively. Investors perceived this event a gigantic incident, because earthquake of such intensity was the first after independence. The previous earthquake of such intensity was in Quetta in 1925, which destroyed the whole city.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	.005	.005	.0056	.0076	0.010	0.008	0.005	0.006	0.008	0.007
T statistics	1.93	0.540	1.350	2.78	4.500	3.02	2.16	2.15	2.47	1.40
P Value	.055	0.589	0.180	0.006	0.000	0.003	0.032	0.033	0.014	0.163
Volatility	-.684	-3.92	-2.53	-2.35	-2.390	-1.157	0.203	0.545	1.055	2.278
T statistics	-1.39	-2.28	-3.41	-4.81	-5.660	-2.370	0.44	0.99	1.82	2.260
P Value	0.16	0.023	0.001	0.00	0.0000	0.019	0.658	0.321	0.069	0.024
Dummy	-.005	.0056	.0004	-.002	-0.005	-.0068	-0.008	-0.01	-.014	-.018
T statistics	-0.34	1.180	0.220	-1.61	-4.33	-5.05	-6.89	-7.33	-9.01	-6.67
P Value	.734	0.238	0.826	0.108	0.00	0.00	0.00	0.00	0.00	0.000
F statistics	1.01	-	-	-	-	-	-	-	-	-
F Sig	0.36	-	-	-	-	-	-	-	-	-
Adj R²	.0001	-	-	-	-	-	-	-	-	-
Pseudo R²	-	0.09	0.07	.0574	0.0292	0.0077	0.0031	0.005	.0225	0.064

Table 2 Regression Results Earthquake of October 8, 2005

4.2. September 11, 2001 Attacks

Figure 3 exhibit the returns distribution around the September 11, 2001. Returns exhibit a downward movement after the incident, and Figure 4 exhibits volatility behavior, in which a considerable increase in volatility is visible.

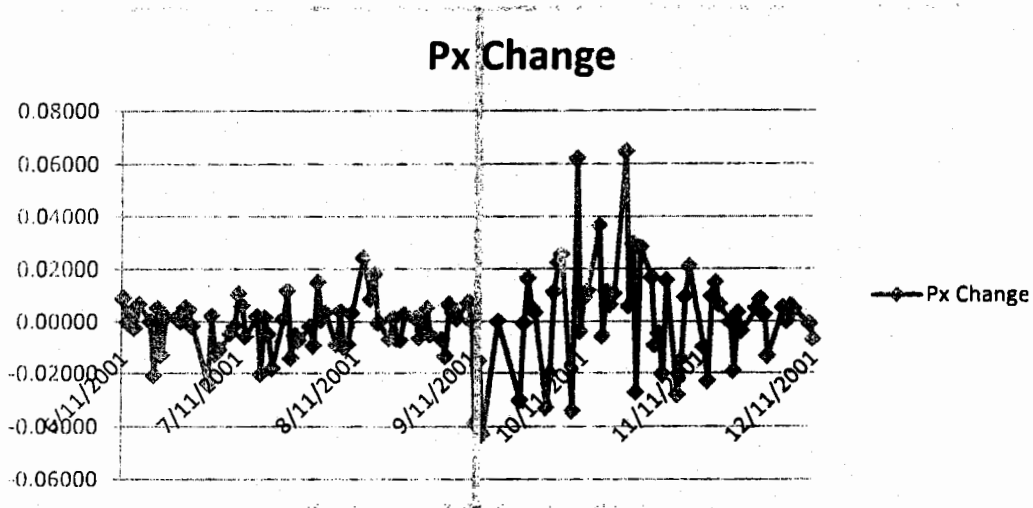


Figure 3 Returns 9/11 Attacks

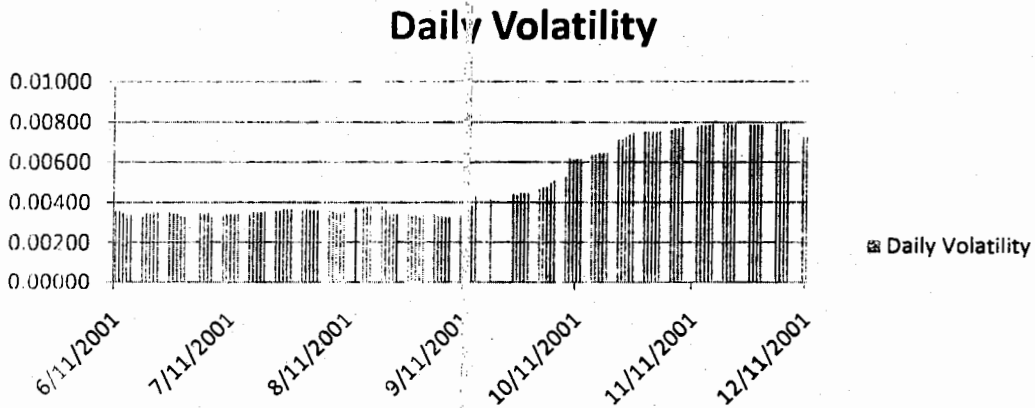


Figure 4 Volatility 9/11 Attacks

Table 3 represents the results of OLS Regression as well as Quintile Regression. OLS Regression results indicate that there is a significant positive relationship between return and standard deviation. It shows an increase in volatility leads to increase in returns insignificantly. However, Quantile Regression indicates that risk, and returns have a significant positive relationship in 0.50 and upper Quantiles. This shows that during middle and high earning period there is a positive risk-return relationship, which is in line with economic theory. Lower Quantiles except 0.10 also show the same relationship but these results are insignificant. Overall results show that after the event volatility increased, which lead to increase in returns in Karachi stock Exchange.

OLS Regression shows a negative but insignificant relationship between Dummy and return. Quantile Regression results show a negative relationship between Return and dummy in lower Quantiles. These results show that, due to attack returns of the low earning period decreased significantly.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	-0.0061	-0.006	-0.009	-0.008	-0.006	-0.0048	-0.0044	-0.0052	-0.004	-0.008
T statistics	-1.99	-1.00	-2.54	-3.01	-1.72	-2.09	-1.83	-1.80	-1.23	-1.6
P Value	0.048	0.318	0.012	0.003	0.087	0.038	0.069	0.074	0.220	0.111
Volatility	1.466	-1.88	.366	0.875	1.184	1.304	1.719	2.503	3.017	5.25
T statistics	2.58	-1.69	0.52	1.600	1.64	3.02	3.860	4.70	4.82	5.46
P Value	0.011	0.092	0.601	0.110	0.102	0.003	0.000	0.00	0.00	0.00
Dummy	-0.0013	-0.018	-0.022	-0.002	0.0008	0.0003	0.0019	0.0007	0.007	0.007
T statistics	-0.40	-2.94	-5.74	-0.74	0.21	0.15	0.75	0.23	1.98	1.27
P Value	0.687	0.004	0.000	0.110	0.836	0.878	0.451	0.815	0.049	0.206
F statistics	3.41	-	-	-	-	-	-	-	-	-
F Sig	0.0348	-	-	-	-	-	-	-	-	-
Adj R²	0.0200	-	-	-	-	-	-	-	-	-
Pseudo R²	-	.0927	.0223	.0074	0.0089	0.0231	0.0357	0.0486	0.0750	.1212

Table 3 Regression Results 9/11 Attacks

4.3. Benazir Bhutto Assassination

Figure 5 exhibits the returns' distribution around the Benazir Bhutto assassination. Returns exhibit an abrupt downward movement, and Figure 6 exhibits exact volatility behavior, in which a sudden upward shift in volatility is visible.

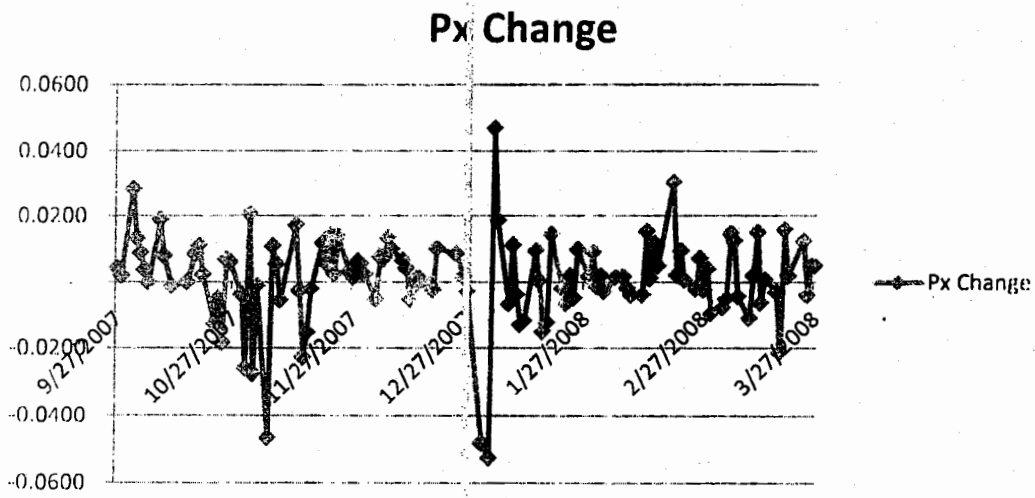


Figure 5 Return Benazir Bhutto Assassination

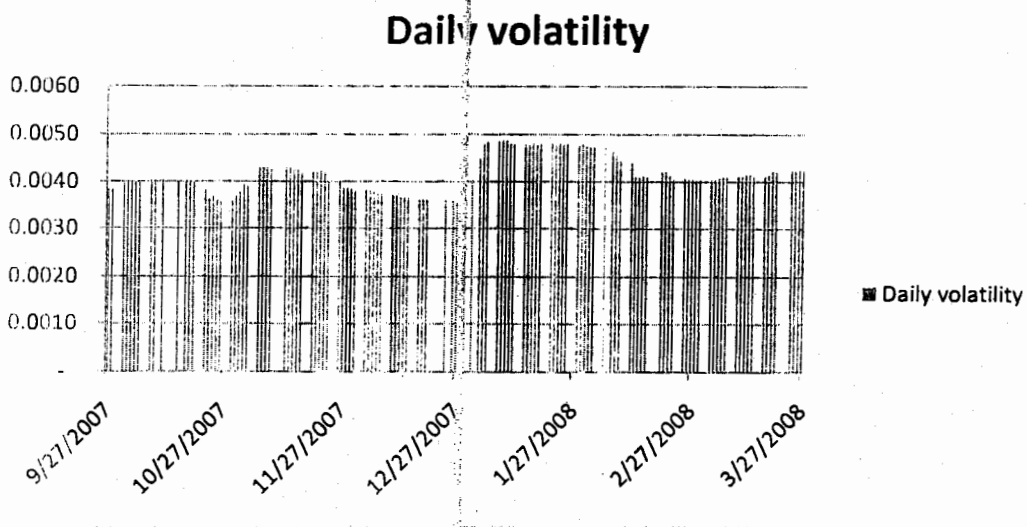


Figure 6 Volatility Benazir Bhutto Assassination

Table 4 represents the results of OLS Regression as well as Quantile Regression. OLS Regression results indicate that there is a significant relationship between return and standard deviation. It shows that the Benazir Bhutto assassination incident has a significant impact on stock market volatility, due to increase in volatility returns also increased significantly. Quantiles Regression indicates that risk, and returns have a significant positive relationship in upper 0.7 and 0.8 Quantiles. In results, 0.7 And 0.8 quintiles indicate the positive risk and return relationship, which is in line with economic theory. Other Quantiles except 0.10, exhibit same results but they are insignificant. These results show an increase in returns due to increase in volatility. Market volatility increased after this event significantly. A very important aspect of these results is that Quantile Regression shows the impact in 0.7 and 0.8 Quantiles only. If we compare it with figure 5, we see that decrease in return is abrupt, and soon it recovers and behaves normally. It means that the event has a significant but short-period impact on returns. However, OLS regression only explains the impact of an event on returns but not exhibits in a manner as Quantile Regression is predicting. It means that Quantile regression is better than OLS regression.

OLS Regression shows a negative but insignificant relationship between Dummy and return. Quantile Regression results are insignificant for all Quantiles except 0.30 Quantile, which show the significant negative relationship in 0.3 Quantile. It means that, this event has a mild impact on stock market returns during the low earning period. Due to Benazir Bhutto, assassination returns of the low earning period decreased a little.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	-0.0119	-0.0173	-0.0158	-0.0127	-0.0045	-0.002	0.0001	-0.003	-0.0052	-0.004
T statistics	-2.27	-0.96	-1.66	-2.08	-0.80	-0.65	0.03	-0.72	-1.03	-0.48
P Value	0.024	0.337	0.099	0.038	0.426	0.516	0.979	0.471	0.303	0.633
Volatility	3.25	-3.999	2.166	2.3684	1.068	1.235	1.1666	2.75	4.235	4.83
T statistics	2.24	-0.08	0.83	1.41	0.69	0.98	1.11	2.40	2.99	1.88
P Value	0.026	0.935	0.408	0.16	0.49	0.329	0.268	0.017	0.003	0.061
Dummy	-0.0030	.00622	-0.0011	-0.0016	-0.002	-0.0024	-0.0037	-0.0032	-0.005	-0.006
T statistics	-0.0096	0.56	-0.21	-2.08	-0.66	-0.9000	-1.67	-1.37	-1.76	-0.15
P Value	0.339	0.574	0.408	0.038	0.509	0.371	0.096	0.170	0.080	0.882
F statistics	2.52	-	-	-	-	-	-	-	-	-
F Sig	0.082	-	-	-	-	-	-	-	-	-
Adj R ²	0.0121	-	-	-	-	-	-	-	-	-
Pseudo R2	-	0.0085	0.0047	0.0064	0.003	0.0021	0.0083	0.0141	0.0356	0.0573

Table 4 Results Benazir Bhutto Assassination

4.4. Indian Nuclear Test

Figure 7 exhibits the returns' distribution around the Indian Nuclear Test. Returns exhibit a downward movement, and Figure 8 exhibits volatility behavior, which shows an upward shift in volatility.

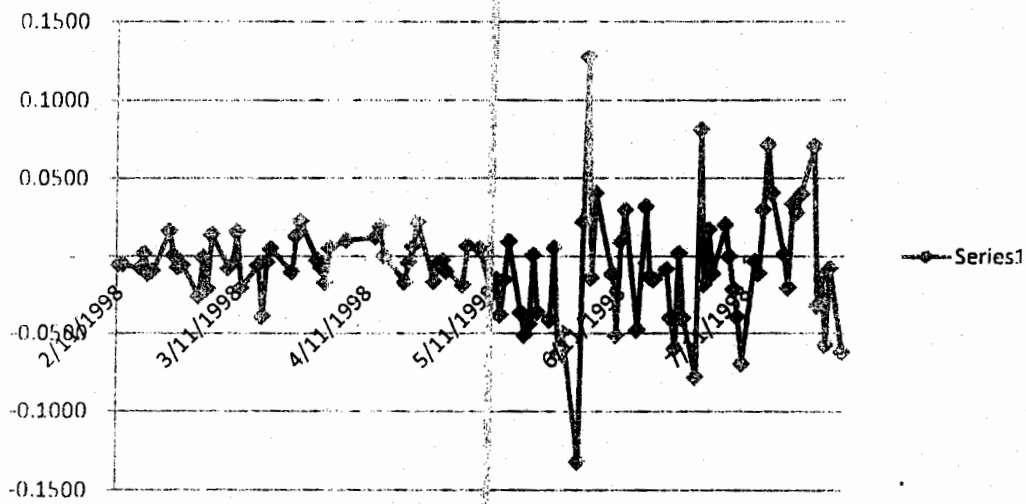


Figure 7 Return, Indian Nuclear Test

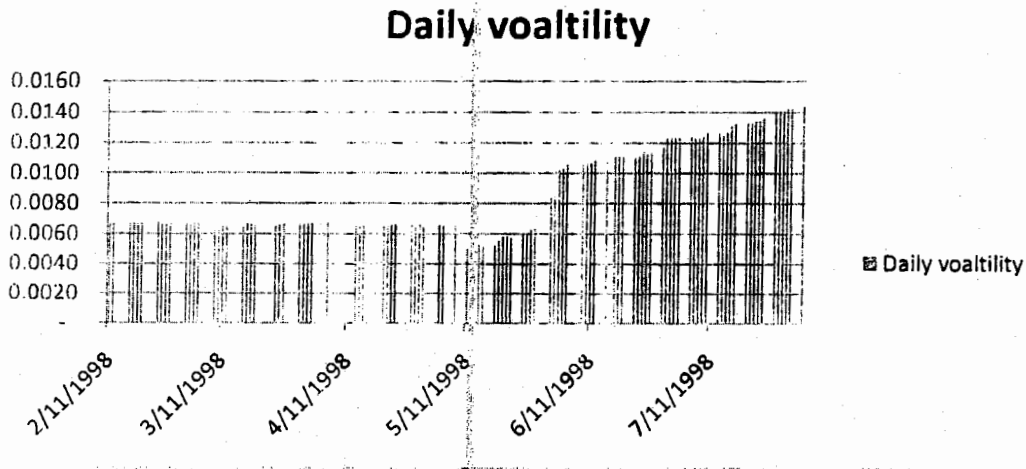


Figure 8 Volatility, Indian Nuclear Test

Table 5 represents the results of OLS Regression as well as Quantile Regression. OLS Regression results indicate that there is a significant positive relationship between return and standard deviation. It shows that the Indian Nuclear Test increased stock market volatility, which leads to increase in returns. Quantile Regression indicates that risk and returns have a significant positive relationship in all Quantiles except 0.1 and 0.2 Quantiles. These results indicate that all quintiles except 0.1 and 0.2 indicate a significant high-risk and return relationship, which is in line with economic theory. Indian Nuclear Test has a significant impact on market volatility. Due to increase in market volatility, returns increased significantly. Overall results show an increase in volatility, which lead to increase in returns, as per the economic rationale.

OLS Regression shows a negative significant relationship between Dummy and return. This show a negative impact of Indian nuclear test on stock market returns during the affected period. Quantile Regression results show a significant negative relationship between return and dummy in 0.5 and below Quantiles, which show a negative impact of the event on the low and medium earning period. Indian nuclear test decreased the returns of the medium and low earning period. If we compare results of Indian and Pakistani nuclear test, we will see that Indian nuclear test have greater impact than Pakistani nuclear test. It may be the unexpected nature of Indian nuclear test, while Pakistani nuclear were expected but timing of the event was uncertain.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50		0.70	0.80	0.90
Intercept	-0.025	-.0320	-.0304	-.0298	-0.036	-.0313	-.0266	-.0167	-.0175	-.014
T statistics	-3.39	-2.10	-2.58	-5.610	-8.17	-5.03	-3.32	-1.97	-2.170	-1.40
P Value	0.001	0.037	0.10	0.000	0.000	0.000	0.001	0.050	0.031	0.162
Volatility	3.4943	1.6617	2.797	3.233	4.554	4.1052	4.00	3.387	4.217	4.916
T statistics	3.43	0.82	1.74	4.46	7.650	4.88	3.72	2.98	3.90	3.51
P Value	0.001	0.414	0.084	0.000	0.000	0.000	0.000	0.003	0.000	0.001
Dummy	-0.015	-.0283	-.0275	-.0246	-.0246	-0.013	-.0091	-.0047	-.0062	-.007
T statistics	-2.78	-2.33	-3.14	-6.12	-7.420	-2.79	-1.48	-0.73	-0.990	-0.970
P Value	0.006	0.020	0.002	0.000	0.000	0.006	0.141	0.469	0.323	0.332
F statistics	6	-	-	-	-	-	-	-	-	-
F Sig	0.0029	-	-	-	-	-	-	-	-	-
Adj R²	0.0431	-	-	-	-	-	-	-	-	-
Pseudo R²	-	0.1076	0.0607	0.0535	0.0351	0.0298	0.0462	0.0582	0.0748	.0943

Table 5 Regression Results, Indian Nuclear Test

4.5. Indian Parliament Attacks

Figure 9 exhibits the returns' distribution around the Indian Parliament Attacks.

Returns decreased suddenly and Figure 10 exhibits volatility behavior, in which volatility increases significantly.

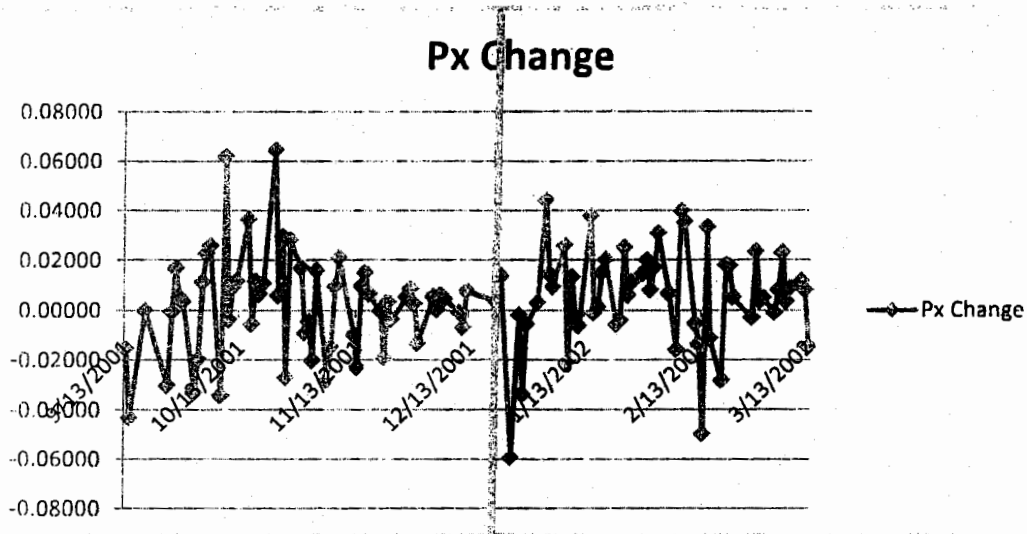


Figure 9 Returns, Indian Parliament Attacks

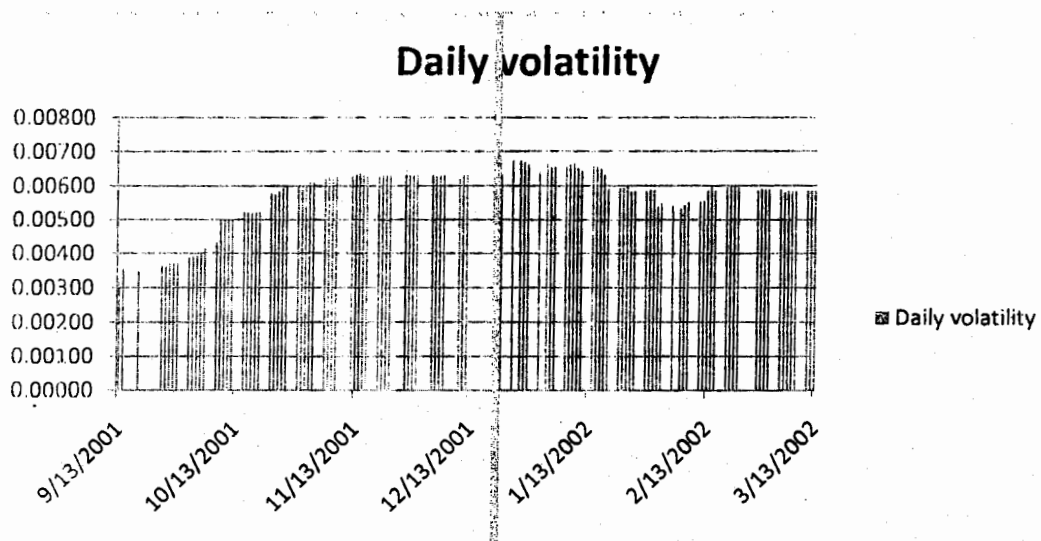


Figure 10 Volatility, Indian Parliament Attacks

Table 6 represents the results of OLS Regression as well as Quantile Regression. OLS Regression results indicate that there is a significant positive relationship between return and standard deviation. It shows that the Indian Parliament Attacks has a significant impact on stock market volatility, which leads to increase in returns, which is according to economic theory. However, Quantile Regression indicates that risk, and returns have a significant positive relationship in 0.6 and above Quantiles. Upper quintiles indicate significant positive risk and return relationship, which is in line with economic theory. Due to Indian parliament attacks volatility increased significantly. This increase in volatility shows an increase in returns, which is in line with the economic rationale that exhibit a positive relationship between risk and return.

Results of OLS and Quantile Regression show an insignificant negative relationship between Dummy and returns, which explain that due to this event, return did not significantly changed. This event did not affected Karachi Stock Market returns.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	-0.0105	-0.0206	-0.0095	-0.0098	-0.0053	-0.0039	-0.0043	-0.0071	-0.0068	-0.011
T statistics	-2.29	-2.27	-1.52	-2.23	-1.08	-0.98	-1.53	-1.79	-1.41	-1.32
P Value	0.023	0.024	0.0130	0.026	0.282	0.328	0.126	0.075	0.160	0.187
Volatility	2.422	.0936	-.1452	.94301	0.7244	1.358	1.902	3.203	3.866	6.597
T statistics	2.650	0.05	-0.12	1.08	0.730	1.68	3.38	4.07	4.11	4.01
P Value	0.009	0.958	0.907	0.280	0.463	.094	0.001	0.000	0.000	0.000
Dummy	-0.0070	-0.0137	-0.0103	-0.0027	-0.0019	-0.0070	-0.0048	-0.0010	-0.0042	-0.006
T statistics	-1.27	-1.21	-1.48	-0.56	-0.33	-1.47	-1.45	-0.24	-0.80	-0.68
P Value	0.204	0.228	0.141	0.577	0.743	0.142	0.149	0.809	0.423	0.499
F statistics	3.66	-	-	-	-	-	-	-	-	-
F Sig	0.0273	-	-	-	-	-	-	-	-	-
Adj R²	0.0218	-	-	-	-	-	-	-	-	-
Pseudo R²	-	0.0126	0.0036	0.0042	0.0036	0.0126	0.0245	0.0377	0.0579	.0827

Table 6 Regression Results, Indian Parliament Attacks

4.6. London Bombing 7/7/ 2005

Figure 11 exhibits the returns' distribution around the 7/7/2005 London's bombing. Returns changed mildly and figure 12 exhibits decrease in volatility significantly.

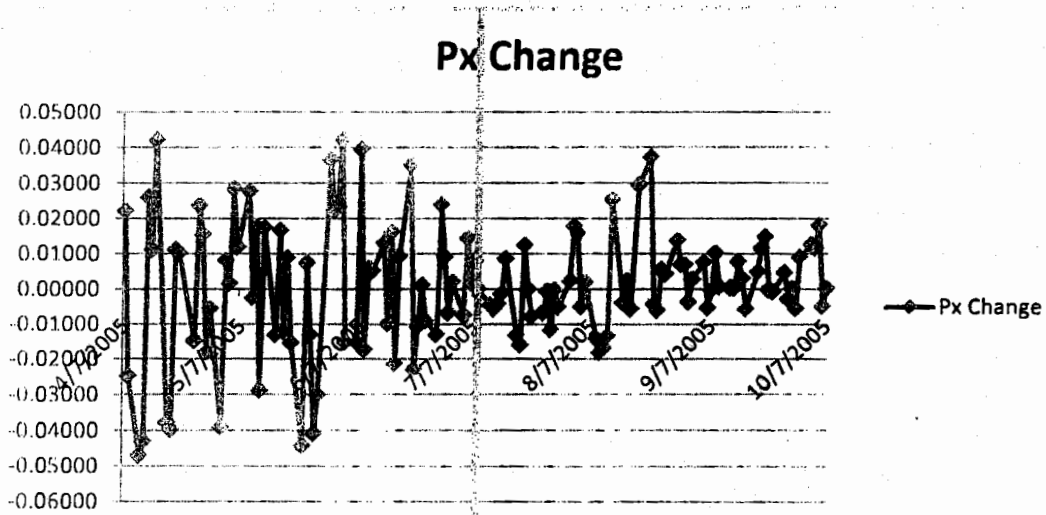


Figure 11 Returns, London Bombing 7/7/ 2005

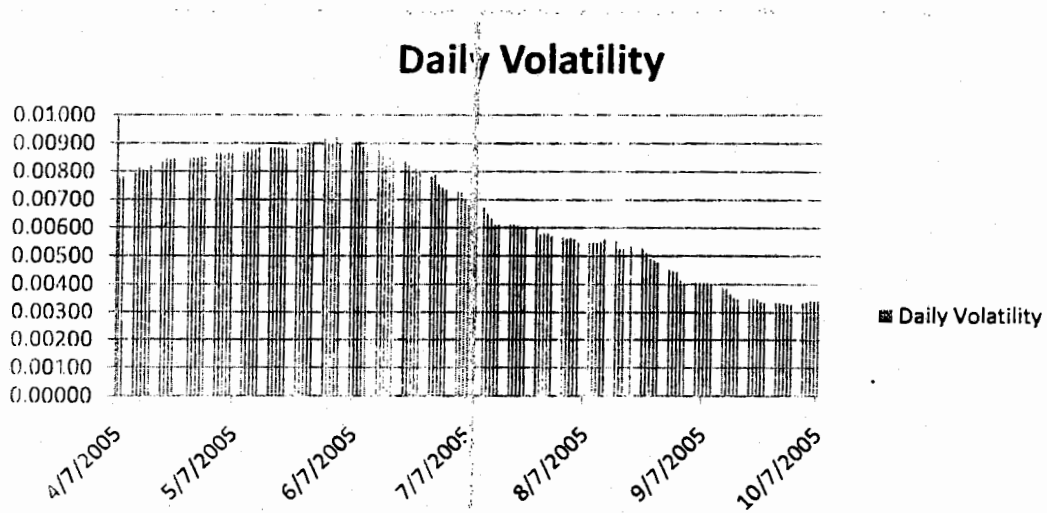


Figure 12 Volatility, London Bombing 7/7/ 2005

Table 7 represents the results of OLS Regression as well as Quantile Regression. OLS Regression results indicate that there is a significant negative relationship between return and standard deviation. It shows that the 7/7/2005 London's bombing has a significant impact on stock market volatility, while volatility is increasing and returns are decreasing. This result is contradicting with the economic rationale. Quantile Regression indicates that risk, and returns have a significant negative relationship in 0.5 and lower Quantiles, while Upper Quantile is insignificant but positive. These results show the increasing in volatility in 0.50 and lower Quantiles leads to decrease in returns during low and medium earning period. This relationship is inconsistent with economic rational, which say that risk and return has a positive relationship in risk and return. When such information arrives in market, investors may lose their ability to make optimal decision therefore such irrational behavior may arise. In 0.60 and above Quantiles show a positive relationship between risk and return that is consistent with economic theory, but these results are statistically insignificant. Overall, these results show irrational and inefficient behavior.

In OLS Regression Dummy is insignificant, show no significant impact of event, while in Quantile Regression 0.5, and above quantiles are significant negative, which show a negative impact of the event during medium and high earning period.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	0.009	0.007	0.013	0.0095	0.012	0.008	0.007	0.0085	0.007	0.014
T statistics	2.880	0.98	4.01	3.290	5.31	3.30	2.70	3.30	1.56	1.84
P Value	0.004	0.326	0.00	0.001	0.00	0.001	0.007	0.001	0.121	0.068
Volatility	-1.290	-5.40	-4.85	-2.83	-2.81	-.878	0.101	0.385	1.659	1.58
T statistics	-2.36	-4.20	-8.18	-5.59	-6.75	-2.01	0.22	0.85	2.09	1.11
P Value	0.0190	0.000	0.00	0.000	0.00	0.046	0.827	0.399	0.038	0.266
Dummy	-0.002	0.009	0.002	0.0008	-.001	-.006	-.008	-.0109	-.0027	-0.007
T statistics	-0.76	0.960	0.67	0.25	-0.36	-2.42	-2.78	-3.76	-2.36	-0.84
P Value	0.449	0.336	0.504	0.803	0.717	0.016	0.006	0.000	0.009	0.399
F statistics	3.26	-	-	-	-	-	-	-	-	-
F Sig	0.0399	-	-	-	-	-	-	-	-	-
Adj R²	0.017	-	-	-	-	-	-	-	-	-
Pseudo R²	-	0.150	0.106	0.0740	0.046	0.023	0.023	0.0198	0.0204	0.0297

Table 7 Regression Results, London Bombing

4.7. Mumbai Attacks

Figure 13 exhibits the returns' distribution around the Mumbai Attacks. If we exclude the trade halt, returns exhibit a downward movement, and figures 14 exhibits volatility behavior, in which a shows considerable increase in volatility.

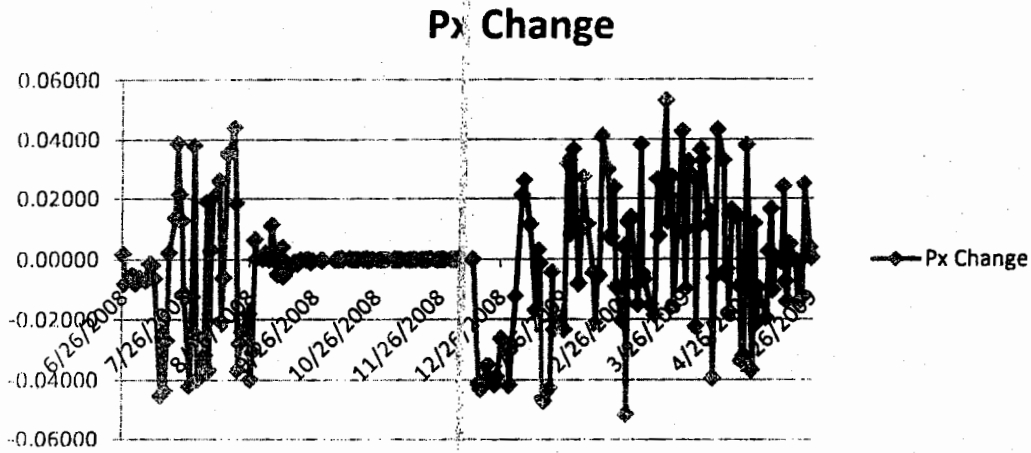


Figure 13 Returns Mumbai Attacks

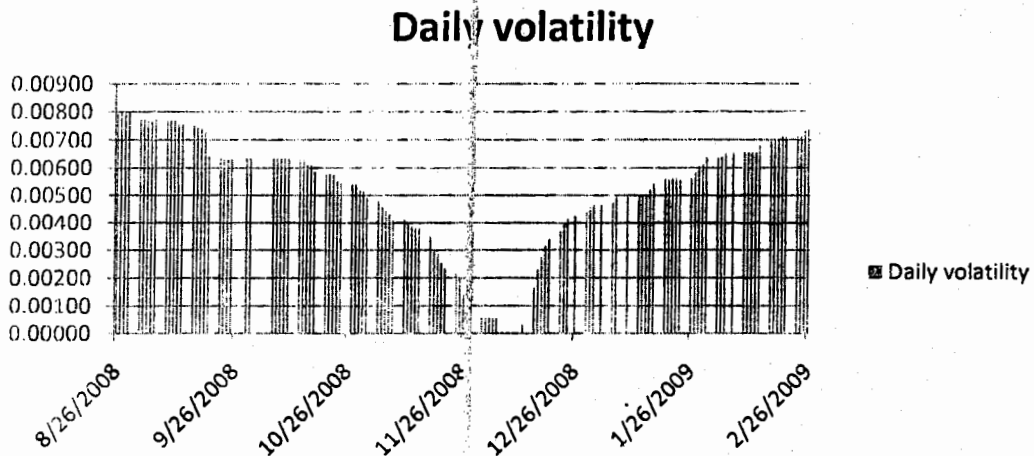


Figure 14 Volatility Mumbai Attacks

Table 8 represents the results of OLS Regression as well as Quantile Regression. OLS Regression results indicate that there is a significant positive relationship between return and standard deviation. OLS Regression results show an increase in volatility, which leads to increase in returns. This positive Risk-Return relationship is consistent with the economic rationale. Quantile Regression indicates that risk, and returns have a significant positive relationship in 0.2 and 0.9 Quantiles, while remaining Quantiles are insignificant. According to results, 0.2 and 0.9 quintiles indicate the high-risk and return relationship, which is in line with economic theory. If we compare results of OLS and Quantile regression, we can see that OLS is also showing an increase in volatility but when we see the graph of return and volatility, we can say that Quantile Regression is better in explaining the behavior of risk and return. This event has three different trends in data one is the decrease in volatility second is trade halt and third is increased in volatility. OLS Regression does not capture this behavior, but Quantile Regression is doing this work well. It shows that Quantile Regression is a good technique and better than OLS Regression. Mumbai terrorist attacks have a significant impact on market volatility.

In OLS Regression Dummy is insignificant, show no significant impact of event on volatility, while in Quantile Regression from 0.2 to 0.5, quantiles are significant negative, which show a negative impact of the event on volatility during low and some part of medium earning period. From 0.6 to 0.9 quantiles are significantly positive, which show a positive impact of the event on stock market returns during some part of medium and completely high earning period. A possible reason of this behavior may be the initial increase in tension arose between both countries. A possible threat of Indian retaliation

increased the uncertainty and stock market affected negatively during low and some part of medium earning period. When tension between both countries decreased and threat of possible Indian retaliation decreased, resulted increase in return and stock market took it positive and reacted positively during high earning period.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	-0.015	-0.0408	-0.0348	-0.0129	.00006	0	-4.3e19	-.00008	-.0005	-.0019
T statistics	-3.27	-3.73	-5.58	-2.39	0.04	0.00	-0.00	-0.09	-0.09	-0.28
P Value	0.001	0.000	0.000	0.018	0.965	1.00	1.00	0.927	0.932	0.728
Volatility	2.315	1.777	3.8599	1.418	-.1193	1.18e15	-1.49e15	0.0623	.862718	3.397
T statistics	2.95	0.83	3.36	1.47	-0.45	0.00	-0.00	0.41	0.91	2.95
P Value	0.003	0.406	0.001	0.142	0.653	1.00	1.00	0.680	0.366	0.003
Dummy	-.0155	-.0408	-.0125	-.0129	-.0079	-.0042	0.0041	0.0111	.01827	.0113
T statistics	-0.67	-0.67	-2.19	-3.52	-7.78	-22.39	776.92	24.36	6.11	2.85
P Value	0.502	0.502	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.005
F statistics	4.36	-	-	-	-	-	-	-	-	-
F Sig	0.0138	-	-	-	-	-	-	-	-	-
Adj R²	0.0268	-	-	-	-	-	-	-	-	-
Pseudo R²	-	0.0365	0.0514	0.0408	0.0306	0.0051	0.0068	0.0582	0.0816	0.114

Table 8 Regression Results, Mumbai Attacks

4.8. President General Pervez Musharraf Emergency

Figure 15 exhibits the returns' distribution around emergency of November 3, 2007, which shows a decrease in returns after the event. Figure 16 exhibits volatility behavior, which shows a considerable increase in volatility for a short period.

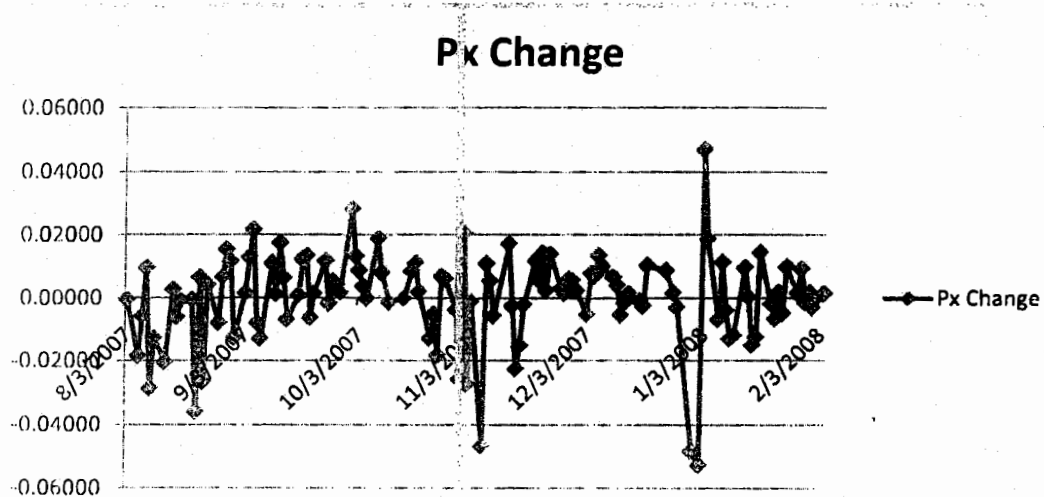


Figure 15 Returns, Musharraf Emergency of Nov 3 2007

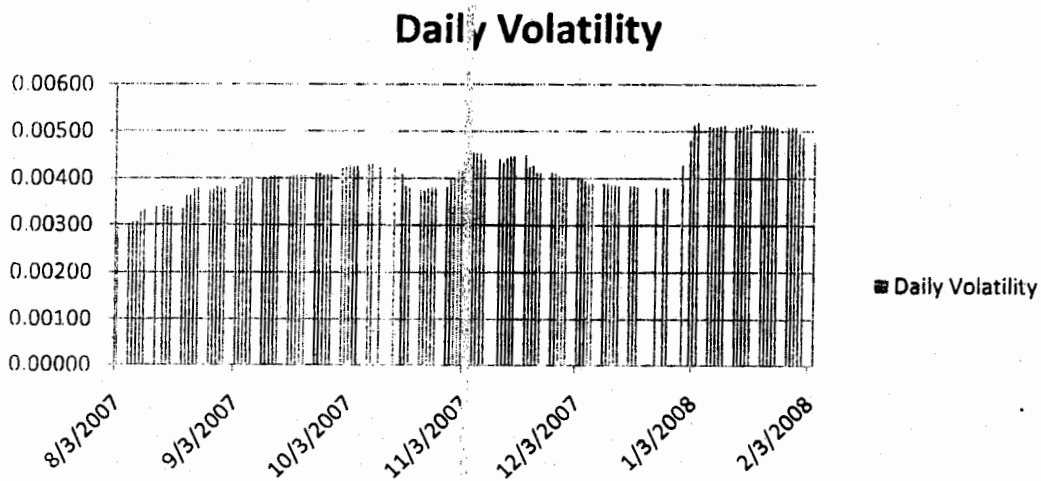


Figure 16 Volatility, Musharraf Emergency of Nov 3 2007

Table 9 represents the results of OLS Regression as well as Quantile Regression. OLS Regression results indicate that there is an insignificant positive relationship between return and standard deviation. It shows that the November 3, 2007 has an insignificant impact on stock market volatility, which increased returns insignificantly. While Quantile Regression indicates that risk and returns have a significant positive relationship in 0.7 and above Quantiles, while remaining Quantiles are insignificant, this shows an increase in volatility due to this event. According to results 0.7 and upper quintiles, indicate the high-risk and return relationship, which is in line with economic theory, while 0.5 and below Quantiles show a negative relationship between risk and return. This show that increase in volatility leads to the reduction in returns, which is inconsistent with the economic rationale but these results are insignificant. If we compare results of OLS and Quantile regression, we can see that OLS is not showing any significant impact on volatility. When we see the graph of return and volatility, we found that there is an impact of the event, but it is small. OLS Regression is unable to capture this impact, while this Quantile Regression did this appropriately. We can say that Quantile Regression is better in explaining the behavior of risk and return.

Dummy variable is insignificant in both OLS Regression and Quantile Regression, which show that this event has no significant impact on stock market returns. It shows that investors did not found this event important.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	-0.0013	-0.0097	-0.0044	.00115	.00132	.00328	.00131	.00009	.00166	.0026
T statistics	-.35	-0.76	-0.72	0.26	0.38	1.14	0.81	0.03	0.41	0.55
P Value	0.726	0.447	0.474	0.798	0.703	0.25	0.42	0.977	0.68	0.582
Volatility	.558	-0.635	-.4136	-1.011	-.5333	-0.400	.1802	1.7921	2.1417	2.748
T statistics	0.56	-0.19	-0.25	-0.85	-0.58	-0.52	.18	2.07	2.00	2.15
P Value	0.579	0.849	0.801	0.399	0.564	0.601	0.861	0.04	0.047	0.032
Dummy	-0.0012	-.01	.00052	0.001	.00235	.00161	.0019	-.0011	.00068	-.00008
T statistics	-.39	-0.99	0.11	0.31	0.84	0.69	0.60	-.041	0.21	-0.03
P Value	0.698	0.323	0.914	0.754	0.4	0.491	0.546	0.683	0.836	0.979
F statistics	0.19	-	-	-	-	-	-	-	-	-
F Sig	0.8247	-	-	-	-	-	-	-	-	-
Adj R²	-0.005	-	-	-	-	-	-	-	-	-
Pseudo R²	-	0.01	0.0008	0.0039	0.0023	.00023	0.0021	0.0083	0.0203	0.034

Table 9 Regression Results, Musharraf Emergency of Nov 3 2007

4.9. President Pervez Musharraf Resign

Figure 17 exhibits the returns' distribution around the President Pervez Musharraf Resign, which shows a little downward movement of return after the event that trades halt, started after some time. Figure 18 exhibits volatility behavior, which shows the very little increase in volatility. Volatility started to decrease gradually some time after the event.

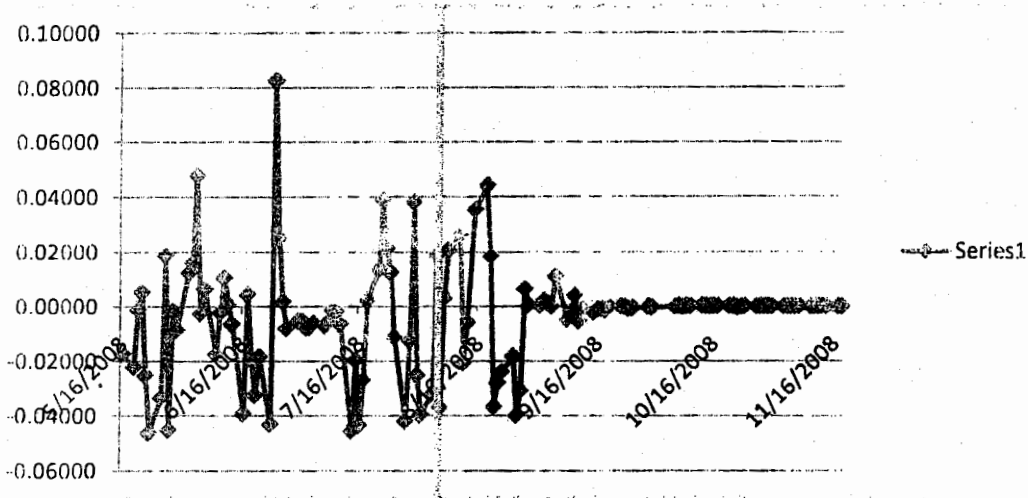


Figure 17 Returns, President Pervez Musharraf Resign

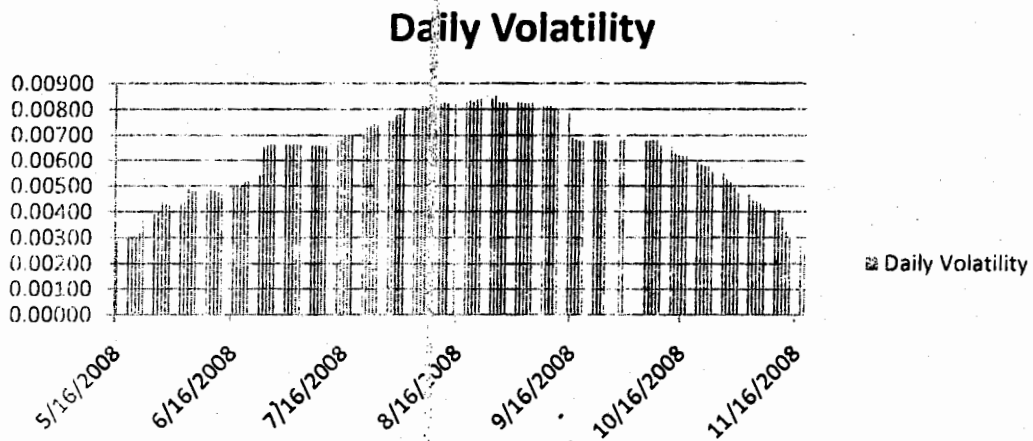


Figure 18 Volatility, President Pervez Musharraf Resign

Table 10 represents the results of OLS Regression as well as Quantile Regression. OLS Regression results indicate that there is positive but an insignificant relationship between return and standard deviation. It shows that the President Musharraf resigned as president has an insignificant impact on stock market volatility, which leads to increase in returns. Quantile Regression indicates that risk and returns have a significant negative relationship in 0.2 and positive in 0.90 Quantiles. It shows that during low earning period risk return has negative relationship, which is not acceptable in modern finance. It shows that when such event occurs investors may lose their ability to make optimal decision and such inefficiency may arise. While 0.9 quantile is significantly positive, this is a rational behavior.

OLS Regression shows a negative but insignificant relationship between Dummy and return. Quantile Regression results show the positive returns and dummy in 0.3 to 0.5 Quantiles, which show a positive relationship between Dummy and Returns. These results show a positive impact of the event on returns caused an increase in returns during the low earning period partially, and during the medium earning period. In other Quantiles, including 0.6 and above show a significant negative relationship between Return and Dummy. These results show a negative impact of the event caused a decrease in returns during the high earning period.

Results shows that after president Musharraf resign, Returns affected significantly, during medium earning period responded it positive and increased, while during high earning period returns decreased significantly. It show that during low and medium earning period investors took this event good, which was a shift from dictatorship to democracy.

But when investors realized that the future of political situation is not good, stock market affected negatively.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	-0.006	-0.0222	-0.0029	-0.0054	-0.0044	-0.0018	.00075	.00392	.0051	-.0025
T statistics	-1.80	-3.32	-0.57	-1.68	-4.15	-8.29	114.86	12.05	1.60	-0.44
P Value	0.037	0.001	0.571	0.093	0.000	0.000	0.000	0.000	0.111	0.657
Volatility	.6852	-.9173	-2.843	-.6393	-.1534	-.0129	-3.39e	.04354	.9985	3.883
T statistics	1.16	-0.63	-3.14	-1.10	-0.79	-0.32	-0.000	0.73	1.61	3.38
P Value	0.247	0.526	0.002	0.2772	0.431	0.747	1.000	0.464	0.108	0.001
Dummy	-.0024	-.0097	.00158	.00565	.0045	.0019	-.0007	-.0039	-.0057	.0011
T statistics	-0.99	-1.47	0.39	2.35	5.74	11.22	-153.7	-17.34	-2.54	0.27
P Value	0.325	0.144	0.698	0.019	0.000	0.000	0.000	0.000	0.012	0.785
F statistics	1.01	-	-	-	-	-	-	-	-	-
F Sig	0.3659	-	-	-	-	-	-	-	-	-
Adj R²	0.0001	-	-	-	-	-	-	-	-	-
Pseudo R²	-	0.0152	0.0212	0.0184	0.0257	0.0056	0.0018	0.0232	0.0502	.1019

Table 10 Regression Results, Musharraf Resign

4.10. General Pervez Musharraf Takeover

Figure 19 exhibits the returns' distribution around the General Pervez Musharraf Takeover of October 12, 1999. Following the takeover returns dropped significantly for very short time. Figure 20 exhibits volatility behavior, in which initially mild increase in volatility shown, so an advance technique is required to study the impact of this event.

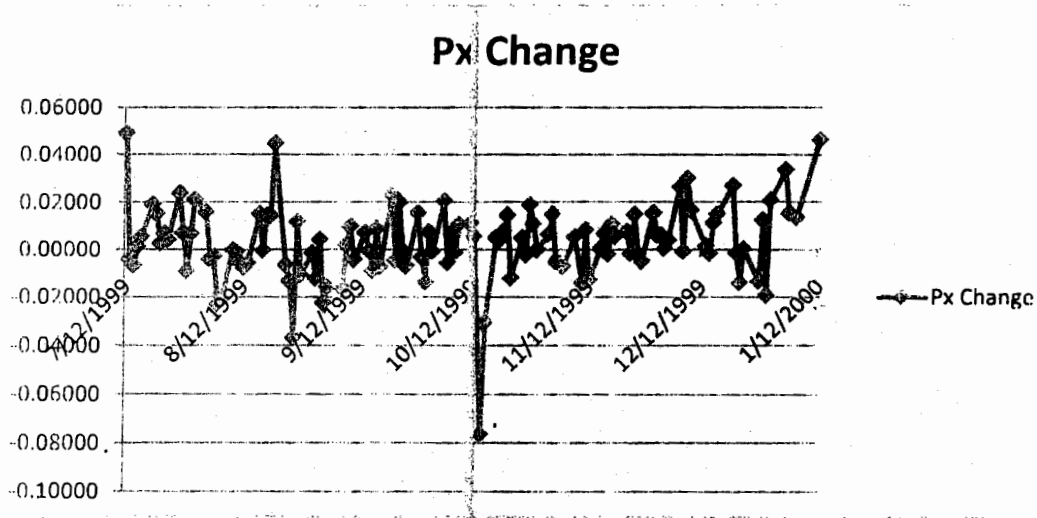


Figure 19 General Pervez Musharraf Takeover

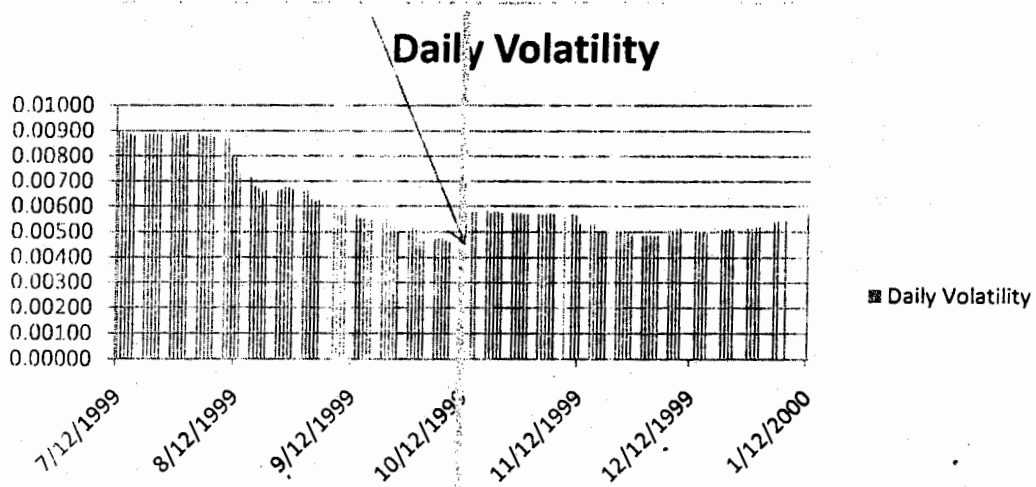


Figure 20 Volatility, General Pervez Musharraf Takeover

Table 11 represents the results of OLS Regression as well as Quantile Regression. OLS Regression results indicate that there is a negative and significant relationship between return and standard deviation. It shows that the General Pervez Musharraf Takeover of October 12, 1999 has a significant impact on stock market volatility. These results show that as volatility is increasing returns are decreasing; this is inconsistent with economic rationale, which says that risk and returns has positive relationship between risk and return. This irrational behavior may be due to inability of investors to make optimal decision, which affected risk-return relationship. Quantile Regression indicates that risk, and returns have a significant negative relationship in all Quantiles except 0.3, 0.4 and 0.8 Quantiles. It shows a significant increase in volatility. These results show an increase in volatility lead to decrease in returns, which is contradicting with economic rationale. In remaining insignificant Quantiles 0.3, 0.4 and 0.8 are also showing a negative relationship but these are insignificant. Musharraf resign has a significant impact on market volatility. Overall results show inefficiency of market due to inability of investors to make optimal decisions. This event created knightian uncertainty in market, so investors unable to make rational decision and market behavior was inefficient.

OLS Regression shows a negative but insignificant relationship between Dummy and return. Quantile Regression shows that except 0.7 Quantile, all Quantiles have insignificant relationship between Dummy and Returns. 0.7 Quantile shows a significant negative relationship between return and dummy. Due to this event, returns during high earning period decreased partially.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	.0189	.0204	.01711	.00775	.00913	.0174	.0215	.027	.0267	.0267
T statistics	2.84	1.50	1.77	1.19	1.38	2.47	3.70	3.78	2.49	2.22
P Value	0.005	0.135	0.078	0.237	0.169	0.014	0.000	0.000	0.013	0.028
Volatility	-2.405	-6.579	-4.416	-1.887	-1.55	-2.136	-2.217	-2.229	-1.276	.0386
T statistics	-2.44	-3.34	-3.13	-1.97	-1.59	-2.06	-2.58	-2.17	-0.81	0.02
P Value	0.015	0.001	0.002	0.05	0.112	0.041	0.010	0.031	0.419	0.983
Dummy	-.0058	.00314	.0023	-.0002	-.0002	-.0010	-.0036	-.0082	-.0111	-.012
T statistics	-1.55	0.35	0.39	-0.06	-0.08	-0.26	-1.14	-2.15	-1.95	-1.88
P Value	0.123	0.723	0.694	0.951	0.938	0.795	0.257	0.033	0.052	0.062
F statistics	3.30	-	-	-	-	-	-	-	-	-
F Sig	0.0385	-	-	-	-	-	-	-	-	-
Adj R²	0.0182	-	-	-	-	-	-	-	-	-
Pseudo R²	-	0.082	0.0303	0.0147	0.011	0.0121	0.015	0.0175	0.0232	.0451

Table 11 Regression Results, Musharraf takeover

4.11. Osama Bin Laden Murder

Figure 21 shows a decline in return on May 2 2011. Figure 22 shows an increase in volatility, although this volatility is not so much high.

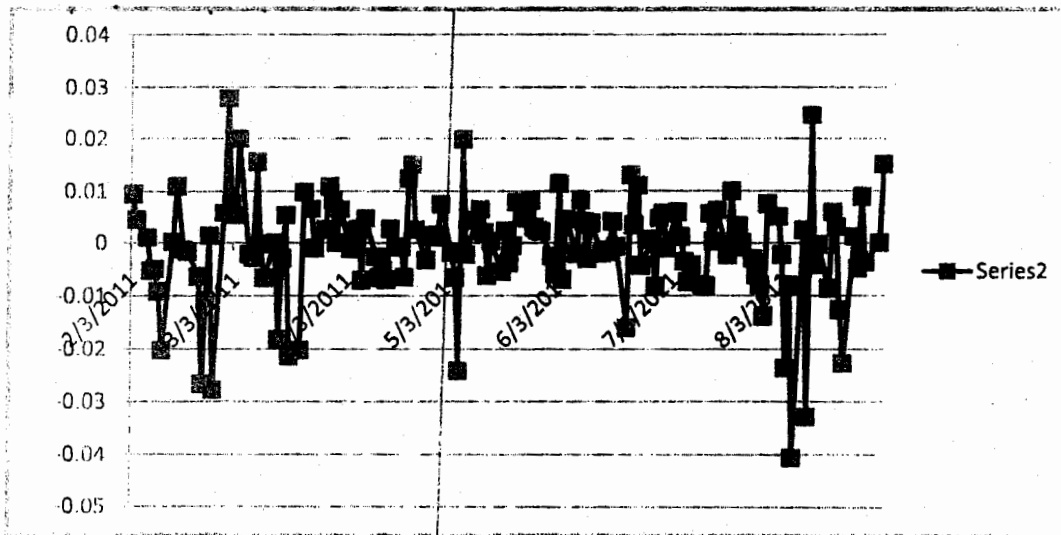


Figure 21 Returns. Osama Bin Laden assassination

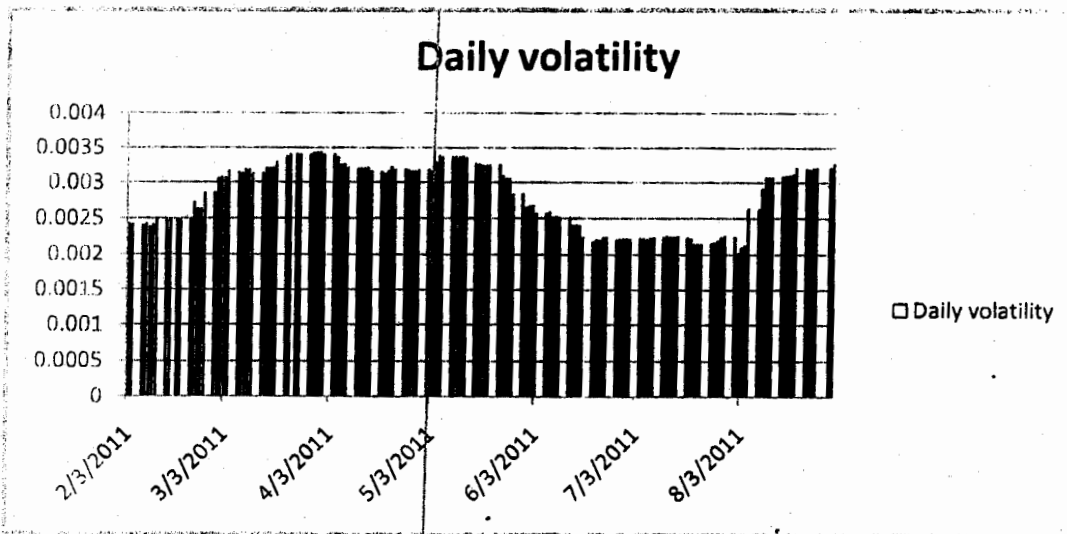


Figure 22 Volatility, Osama Bin Laden assassination

Table 12 shows results of OLS Regression as well Quantile Regression results. OLS Regression results show a positive but an insignificant relationship of Return on volatility. Quantile Regression results are insignificant for all Quantiles, but these are also exhibiting positive relationship. It shows that this event has positive but insignificant impact on stock volatility in Karachi Stock Exchange, which leads to insignificant increase in returns when volatility is increasing. Overall results are showing same behavior of risk and returns.

OLS Regression shows a negative but insignificant relationship between Dummy and return. Quantile Regression results show a negative but insignificant relationship in all Quantiles except 0.40 Quantile, which show a little negative impact of event during medium earning period.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	-0.0078	-0.0110	-0.0144	-0.0074	-0.0067	-0.0053	-0.0040	-0.0011	.00004	-.002
T statistics	-1.91	-0.080	-3.02	-1.52	-1.92	-1.50	-0.85	-.22	.01	-0.38
P Value	0.058	0.423	0.003	0.131	0.056	0.134	0.394	0.83	.992	0.707
Volatility	2.772	.8558	3.196	1.489	1.9711	2.101	2.085	2.1136	2.3923	4.841
T statistics	1.81	0.17	1.77	0.81	1.51	1.57	1.18	1.08	1.66	1.72
P Value	0.072	0.868	0.078	0.419	0.132	0.118	0.241	0.282	.099	0.087
Dummy	-.0039	-.0142	-.0039	-.0037	-.0034	-.0019	-.0009	-.0018	-.0014	-.002
T statistics	-1.94	-1.89	-1.60	-1.51	-2.02	-1.10	-0.42	-0.74	-0.79	-0.75
P Value	0.054	0.06	0.110	0.133	0.045	0.274	-0.42	0.458	.430	0.457
F statistics	2.72	-	-	-	-	-	-	-	-	-
F Sig	0.0683	-	-	-	-	-	-	-	-	-
Adj R ²	0.0164	-	-	-	-	-	-	-	-	-
Pseudo R ²	-	0.0567	0.0156	0.0118	0.0091	0.0103	0.667	.0071	.0107	.0204

Table 12 Regression Results, Osama Bin Laden assassination

4.12. Pakistan Nuclear Test

Figure 23 exhibits the returns' distribution around the Pakistan Nuclear Test. Returns exhibit and significant downward movement in returns. Figure 24 exhibits volatility behavior, which describes an upward shift in volatility.

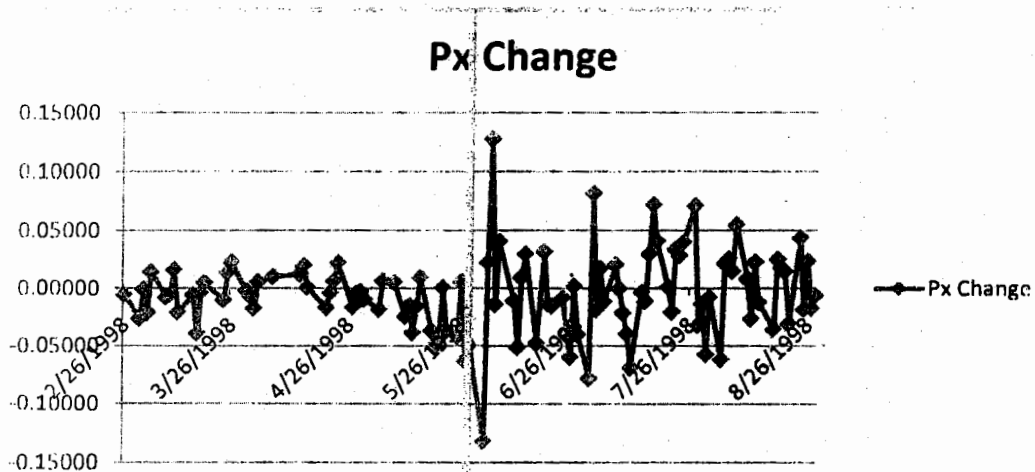


Figure 23 Return, Pakistan Nuclear Test

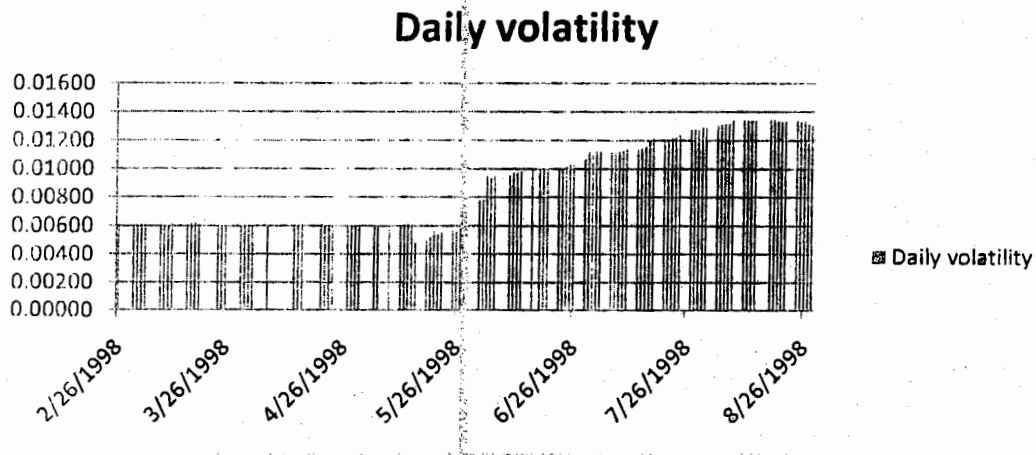


Figure 24 Volatility, Pakistan Nuclear Test

Table 13 represents the results of OLS Regression as well as Quantile Regression. OLS Regression results indicate that there is a significant positive relationship between return and standard deviation. It shows that the Pakistani Nuclear Test has a significant impact on stock market volatility, which leads to increase in returns and is consistent with economic rationale. Quantile Regression also indicates that risk and returns have a significant positive relationship in all Quantiles except 0.1, 0.2, 0.3 and 0.8 Quantiles. Results show an increase in volatility in Karachi Stock Market leads to an increase in returns. Pakistani nuclear test has a significant impact on market volatility. Market volatility increased after this event significantly, which leads to increase in returns. If we compare the results Indian and Pakistani nuclear test, we find that only 0.1 and 0.2 Quantiles have insignificant values and remaining Quantiles are significant for Indian nuclear test. This shows that KSE took the greater impact of Indian nuclear test and also priced the impact of expected nuclear test of Pakistan. The only ambiguity was in timing of Pakistani response against Indian nuclear tests.

OLS regression results show a negative but insignificant relationship between Dummy and Returns, which show an insignificant impact of nuclear test on KSE returns. Quantile Regression results show a significant negative relationship between return and dummy in 0.4 and 0.5 Quantiles, which show a significant negative impact of the event on average earning periods. In comparison to Pakistan's nuclear test results with Indian nuclear test, it is clear that Karachi stock Exchange took the greater impact of Indian nuclear test, because lower and medium Quantiles are significant in Indian case while in Pakistan's case only medium Quantiles show a negative impact of the event.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	-0.0238	-0.0536	-0.0279	-0.0126	-0.0191	-0.0264	-0.0262	-0.0170	-0.0034	-0.013
T statistics	-2.40	-1.90	-1.46	-0.95	-2.78	-3.63	-2.35	-1.32	-0.32	-1.08
P Value	0.017	0.059	0.145	0.341	0.006	0.000	0.019	0.187	0.751	0.283
Volatility	2.808	3.104	1.09	.363	1.9596	3.427	4.0611	2.6709	2.315	4.996
T statistics	2.12	0.80	0.42	0.20	2.12	3.53	2.75	2.46	1.590	2.85
P Value	0.035	0.427	0.676	0.839	0.035	0.001	0.006	0.015	0.114	0.005
Dummy	-0.0086	-0.025	-0.0176	-0.0065	-0.0139	-0.0127	-0.0121	-0.00006	.0068	-0.004
T statistics	-1.23	-1.13	-1.23	-0.70	-2.85	-2.47	-1.54	-0.01	0.840	-.44
P Value	0.221	0.258	0.22	0.482	0.005	0.014	0.126	0.992	0.40	0.664
F statistics	2.52	-	-	-	-	-	-	-	-	-
F Sig	0.082	-	-	-	-	-	-	-	-	-
Adj R²	0.0135	-	-	-	-	-	-	-	-	-
Pseudo R²	-	0.0471	0.014	0.0045	0.0119	0.02	0.0294	0.0453	0.058	0.898

Table 13 Regression Results, Pakistan Nuclear Test

4.13. Suicide Attacks on Pakistan Ordnance Factories

Figure 25 exhibits the return's distribution around the Suicide Attacks on Pakistan Ordnance Factories. Returns exhibit a mild change in returns. Figure 24 exhibits volatility behavior, which describes no change in volatility.

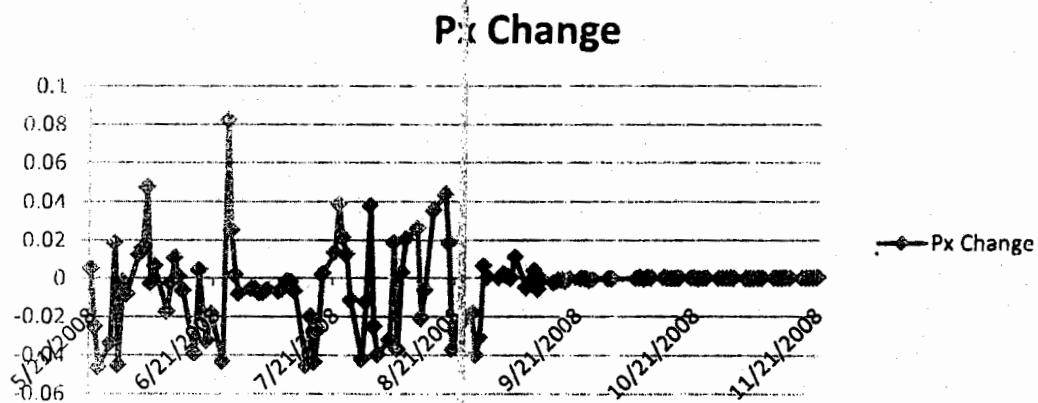


Figure 25 Return, Suicide Attacks on Pakistan Ordnance Factories

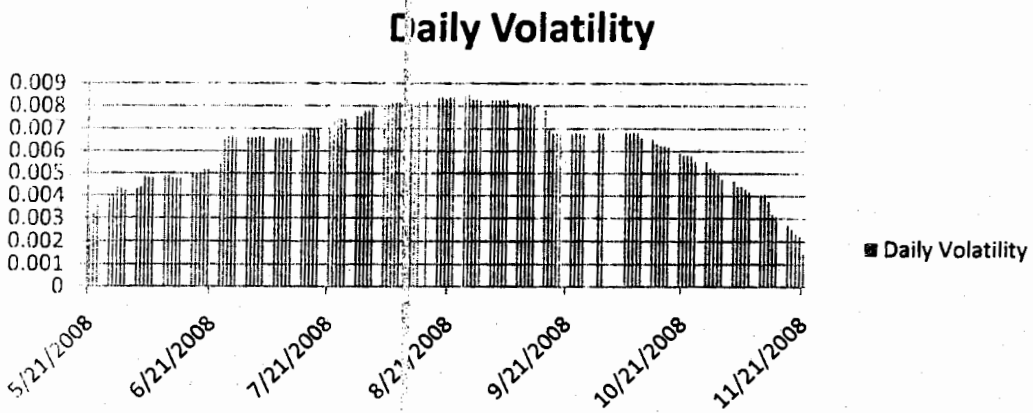


Figure 26 Volatility, Suicide Attacks on Pakistan Ordnance Factories

Table 14 represents the results of OLS Regression as well as Quantile Regression. OLS Regression results indicate that there is a positive but an insignificant relationship between return and standard deviation. It shows that the Suicide Attacks on Pakistan Ordnance Factories has a positive but insignificant impact on stock market volatility. Quantile Regression also indicates that risk, and returns have an insignificant relationship in all Quantiles except 0.2 and 0.9, showing a negative and positive relationship accordingly. 0.60 And below Quantiles except 0.2 Quantile are showing negative relationship between risk and return, but these results are insignificant and against the economic rationale. It shows that increase in volatility leads to decrease in returns of 0.6 and below Quantiles. In upper 0.7 and above Quantiles, results show a positive risk and return relationship, which is according to the economic theory. Overall results show inefficiency of market. It was a first attack on Pakistani defense organization, which assumed the safest.

OLS Regression shows a negative but insignificant relationship between Dummy and return. Quantile Regression results show a significant positive relationship in 0.3 to 0.5 Quantiles, which show a positive impact of the event during partially on the low, complete positive impact on the medium earning period. While 0.7 and 0.8 have a significant negative relationship between Dummy and Return, which show a negative impact of the event on Returns during the higher earning period.

OLS		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	-0.0061	-0.0244	-0.0032	-0.0052	-0.0044	-0.0021	.00075	.00394	.00528	.0004
T statistics	-1.86	-3.46	-0.70	-1.54	-4.09	-9.08	0.000	11.95	1.60	-0.06
P Value	0.065	0.001	0.0486	0.125	0.000	0.000	0.000	0.000	0.111	0.954
Volatility	.70308	-0.9164	-2.804	-0.7183	-0.1538	-0.0124	-1.53e	.03976	.9992	3.291
T statistics	1.21	-0.62	-3.44	-1.19	-0.79	-0.30	-0.00	0.66	1.53	2.37
P Value	0.228	0.537	0.001	0.234	0.431	0.762	1.00	0.509	0.126	0.018
Dummy	-.0025	-.0075	.00281	.0054	.00458	.00215	-.0007	-.0039	-.0059	-.0008
T statistics	-1.06	-1.10	0.75	2.19	5.78	12.56	0.000	-17.56	-2.59	-0.17
P Value	0.289	0.273	0.455	0.030	0.000	0.000	0.000	0.000	0.010	0.866
F statistics	1.15	-	-	-	-	-	-	-	-	-
F Sig	0.3178	-	-	-	-	-	-	-	-	-
Adj R²	0.0012	-	-	-	-	-	-	-	-	-
Pseudo R²	-	0.0085	0.0204	0.0183	0.0258	0.0062	0.0016	0.0241	0.0554	.1098

Table 14 Regression Results, Suicide Attacks on Pakistan Ordnance Factories

4.14. Tsunami and Nuclear Meltdown in Japan

Figure 27 exhibits the returns' distribution around the Tsunami in Japan. Returns exhibit a little change in returns. Figure 28 exhibits volatility behavior, which describes no change in volatility.

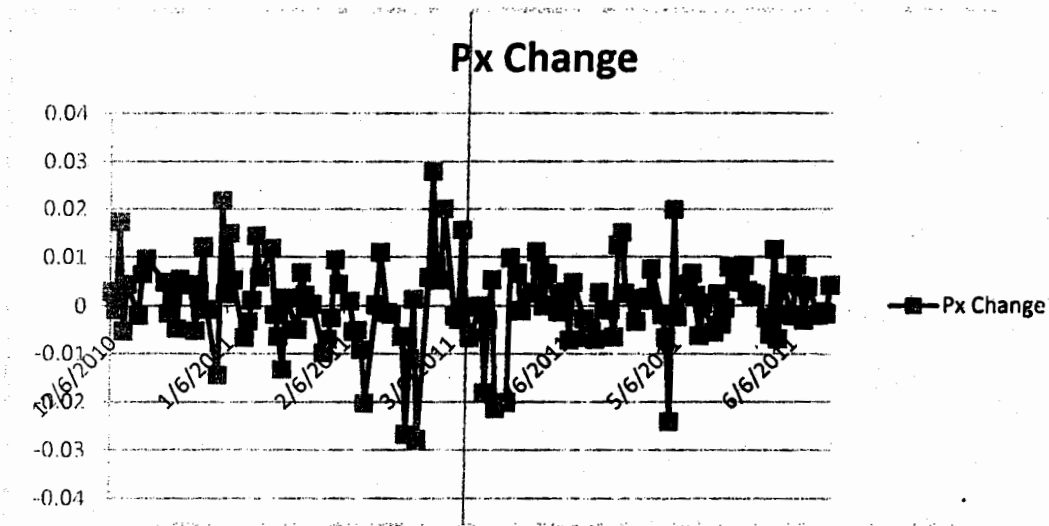


Figure 27 Return, Tsunami and Nuclear Meltdown in Japan

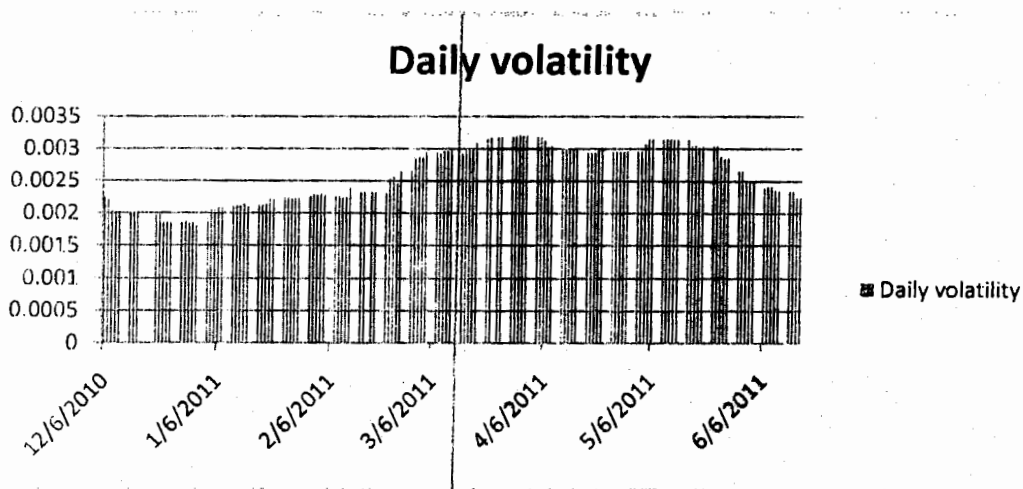


Figure 28 Volatility Tsunami and Nuclear Meltdown in Japan

Table 15 represents the results of OLS Regression as well as Quantile Regression. OLS regression results indicate that there is a positive but an insignificant relationship between return and standard deviation. It shows that the Tsunami and Nuclear Meltdown in Japan have an insignificant impact on volatility, which leads to increase in return. Quantile Regression also indicates that risk, and returns have been positive but an insignificant relationship in all Quantiles. It shows that there is no impact of this event on volatility of Karachi Stock Exchange returns. Overall results show an insignificant impact of the event on stock market volatility. A possible reason of this very insignificant impact may be the vast geographical distance of the affected area.

Results of OLS show a negative but insignificant relationship between Return and Dummy, which show no impact of the event on returns. While Quantile Regression also shows an insignificant relationship between Return and dummy in all Quantiles. It shows that due to the event returns did not changed significantly.

O.L.S		Quantiles Regression								
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
Intercept	-0.0042	-0.0086	-0.0104	-0.0062	-0.0064	-0.0055	-0.0009	.0022	-0.00003	-0.0006
T statistics	-0.96	-0.60	-2.11	-1.27	-1.49	-1.27	-0.20	0.49	-0.01	-0.06
P Value	0.336	0.550	0.036	0.207	0.137	0.206	0.845	0.625	0.995	0.956
Volatility	2.001	.2222	2.200	1.428	2.200	2.7	1.428	1.000	2.7777	5.1
T statistics	1.12	0.04	1.100	0.71	1.27	1.52	0.730	0.55	1.35	1.16
P Value	0.264	0.970	0.273	0.478	0.206	0.130	0.466	0.583	0.178	0.247
Dummy	-0.002	0.001	-0.002	-0.0009	-0.00164	-0.0022	-0.0012	-0.0025	-0.0023	-0.006
T statistics	-1.11	0.15	-1.13	-0.43	-0.910	-1.25	-0.63	-1.40	-1.19	-1.66
P Value	1.12	0.884	0.258	0.67	0.365	0.214	0.532	0.164	0.235	0.099
F statistics	0.77	-	-	-	-	-	-	-	-	-
F Sig	0.4639	-	-	-	-	-	-	-	-	-
Adj R²	-0.002	-	-	-	-	-	-	-	-	-
Pseudo R²	-	0.0024	0.0065	0.0022	0.005	0.0084	0.0037	0.0029	0.0093	0.0179

Table 15. Tsunami and Nuclear Meltdown in Japan

Sr. No	Date	country	Incident	Impact Nature
1	28-05-1998	Pakistan	Pakistan Nuclear Test	Negative in middle Quantiles
2	11-05-1998	India	Indian nuclear test	Negative in Lower and middle Quantiles
3	12-10-1999	Pakistan	Takeover by Musharraf	Partial Negative on Upper Quantiles
4	11-09-2001	US	World Trade Centre New York attacks	Negative in lower Quantiles
5	13-12-2001	India	India parliament New Delhi bombed	No Impact
6	07-07-2005	UK	London Train Bombing	Negative in middle and Upper Quantiles
7	08-10-2005	Pakistan	8 October, 2005 Earthquake	Negative in middle and Upper Quantiles
8	03-11-2007	Pakistan	Emergency Proclamation by Musharraf	No Impact
9	27-12-2007	Pakistan	Benazir assassination	Partial Negative in lower Quantiles
10	18-08-2008	Pakistan	Musharraf Resign	Partial Positive in lower Quantiles & full in middle and Negative in Higher Quantiles
11	11-03-2011	Japan	Tsunami & Nuclear Meltdown	No Impact
12	21-08-2011	Pakistan	Suicide Attacks on Pakistan Ordnance Factories. Wah Cantt	Partial Positive in lower & full in middle and Negative in Higher Quantiles
13	02-05-2011	Pakistan	Osama Bin Laden Assassination	Partial Negative on Medium Quantiles
14	26-11-2008	India	Mumbai Attacks	Negative in lower & Positive in Upper Quantiles

Table 16 Impact of Events

5. Conclusion & Recommendations

5.1. Conclusion:

This study investigates four different categories of extreme events. These include Nuclear Test & accidents, Natural Disasters, Terrorist attacks and political events. Out of fourteen events, three have no impact, eight have negative and three events have mixed impact (i.e. both, positive and negative impact) on Karachi Stock Market returns.

Only one natural disaster is under investigation that is 8 October 2005 earthquake. It has a significant negative impact on returns of Karachi Stock Exchange.

In Industrial / nuclear accidents category only one event is under investigation which is Tsunami in Japan caused the nuclear meltdown, but it has no impact on Karachi Stock Exchange. This reaction may be due to the geographical distance of both countries or there is no nuclear reactor in Pakistan that a joint-stock company is operating.

In this study, we found a significant negative impact of terrorism on stock market returns. To investigate the impact of terrorist attacks, seven terrorist incidents are studied. Four events have significant negative, two have mixed impact and one have no impact on Karachi Stock Market Returns.

Our study reports negative impact of 7/7 Bombing in England, Mumbai attacks, Osama bin Laden murder and Benazir Bhutto murder on Karachi stock Exchange returns. Arshad, Shah et al (2011) also reported negative impact of this event. Suicide attacks on Pakistan Ordnance Factories Wah Cantt have significant positive impact in during lower earning period and significant negative impact on Karachi Stock Market Returns in

higher earning period. Some other studies, including (Angbazo and Narayanan 1996; Blöse, Bornkamp et al. 1996; Carter and Simkins 2004; Cam 2008; Brounen and Derwall 2010) investigated the impact of terrorism on stock market returns. These studies found negative impact of terrorism on stock market returns. In our study, attacks on Indian parliament have the no impact.

Political events have mixed results. Three Political events are included in our study, among which military takeover by General Pervez Musharraf has a negative impact on returns of Karachi Stock Exchange. November 3, 2007 emergency has no impact on Karachi Stock Market. Resignation of President Musharraf has Partial Positive in lower Quantiles & full in middle and Negative in Higher Quantiles impact on Karachi Stock Exchange. These mixed result may be due change in perception of investors. In low and medium earning period investors expected a positive sign toward better economic environment due to transformation from dictatorship to democracy. In higher earning period, market has negative impact it may be due to perception of investors about an instable political environment after the resignation of Mr. Musharraf.

The most widely used technique is event study method, Outlier detection method and GARCH models. In this study Quantile Regression is used It was introduced by Koenker and Bassett (1978). This is an advance nonparametric technique, where outliers did not affect the results negatively and provides better results, which provides better results in presence of outliers than traditional OLS Regression, where normality of data is the most important for accuracy of results. The advantage of Quantile Regression is that it discusses whole distribution rather than mean of the distribution. This study, nine

quantiles are used from 0.10 to 0.90 quantiles. It explains the behavior of variables risk and return and dummy variable in three different earning periods i.e. low, medium and high earning period. In this study, nine quantiles from 0.10 to 0.90 represent three periods i.e. low earning period, medium earning period and high earning period. Results show the impact of events during these three periods. In OLS Regression outliers affects the results adversely. If we compare the results of Quantile Regression and OLS Regression, in OLS Regression only Indian nuclear test shows a significant negative impact on stock market returns, while remaining events have insignificant, while In Quantile Regression only three events have insignificant impact on stock market returns.

Pakistani economy suffered the cost of these events hardly, because these events increased market risk and reduction in trading activity.

Further research can be done on man-made events and natural events. Some studies support the notion that extreme events may have industry differential effect on stock returns so future research on sector level, firm level data will be beneficial, to investigate that the impact of different extreme events on different sector and firms.

References

- Aggarwal, R., C. Inclan, et al. (1999). "Volatility in Emerging Stock Markets." Journal of Financial and Quantitative Analysis 34(01): 33-55.
- Aktar, I. (2005). A Comparison of the Effects of the Chernobyl and Three Mile Island Nuclear Accidents on the US Electric Utility Industry. sosyoekonomi.
- Angbazo, L. A. and R. Narayanan (1996). "Catastrophic Shocks in the Property-Liability Insurance Industry: Evidence on Regulatory and Contagion Effects." The Journal of Risk and Insurance 63(4): 619-637.
- Anonymous (2009). Korean Investors Shrug Off Nuclear Test. Wall Street Journal: C.2.
- Apergis, N. and S. Eleptheriou (2001). "Stock Returns and Volatility: Evidence from the Athens Stock Market Index." JOURNAL OF ECONOMICS AND FINANCE 9(1): 50-61.
- Arin, K. P., D. Ciferri, et al. (2008). "The price of terror: The effects of terrorism on stock market returns and volatility." Economics Letters 101(3): 164-167.
- Arshad, M. U., D. S. M. A. Shah, et al. (2011). "Effects of Terrorism on Capital Market A Case Study of Pakistani Capital Market." Interdisciplinary Journal of Contemporary Research in Business 11: 202-209.
- Attiya, Y. J. and A. Ayaz (1999). "The Response of Karachi Stock Exchange to Nuclear Detonation." The Pakistan Development Review 38(4): 777-786.
- Ayodeji, O. R. (2009 Pp.). "Stock Return, Volatility And The Global Financial Crisis In An Emerging Market: The Nigerian Case." International Review of Business Research Papers 5(4): 426-447.
- Ayodeji, O. R. (2009 Pp.). "Stock Return, Volatility And The Global Financial Crisis In An Emerging Market: The Nigerian Case." International Review of Business Research Papers 5(4): 426-447.
- Bachelier, P. M. L. (1900). Th'éorie de la Sp'éculation. Department Of Mathematics, La Sorbonne University of Paris. **PhD**: 67.
- Baillie, R. T. and P. D. Ramon (1990). "Stock Returns and Volatility." The Journal of Financial and Quantitative Analysis 25(2): 203-214.
- Barros, C. P. and L. A. Gil-Alana (2009). "Stock market returns and terrorist violence: evidence from the Basque Country." Applied Economics Letters 16(15): 1575 - 1579.
- Barth, J. R., T. Li, et al. (2006). "Economic Impacts of Global Terrorism: From Munich to Bali." SSRN eLibrary.

- Barth, J. R., T. Li, et al. (2006). "Economic Impacts of Global Terrorism: From Munich to Bali Capital Studies, Milken Institute, Santa Monica, CA." SSRN eLibrary.
- Beaulieu, M.-C., J.-C. Cosset, et al. (2005). "The impact of political risk on the volatility of stock returns: the case of Canada." J Int Bus Stud 36(6): 701-718.
- Bekaert, G., C. R. Harvey, et al. (2001). "Emerging equity markets and economic development." Journal of Development Economics 66(2): 465-504.
- Blose, L. E., R. Bornkamp, et al. (1996). "Catastrophic events, contagion, and stock market efficiency: The case of the Space Shuttle Challenger." Review of Financial Economics 5(2): 117.
- Bollerslev, T. (1986). "Generalized autoregressive conditional heteroskedasticity." Journal of Econometrics 31(3): 307-327.
- Brounen, D. and J. Derwall (2010). "The Impact of Terrorist Attacks on International Stock Markets." European Financial Management 16(4): 585-598.
- By Jonathan, K. (1998). India's Bourse Turns Volatile After Skirting Turmoil for a Time. Wall Street Journal: 1.
- By Sara, W. (1998). Asian Stocks and Currencies Plummet --- Growing Violence In Indonesia Cited. Wall Street Journal: C.1.
- Cam, M.-A. (2008). "THE IMPACT OF TERRORISM ON UNITED STATES INDUSTRIES." Economic Papers 27(2): 115-134.
- Capelle-Blancard, G. and N. Couderc (2008). "What drives the market value of firms in the defense industry?" Review of Financial Economics 17(1): 14-32.
- Capelle-Blancard, G. and M.-A. Laguna (2010). "How does the stock market respond to chemical disasters?" Journal of Environmental Economics and Management 59(2): 192-205.
- Carter, D. A. and B. J. Simkins (2004). "The market's reaction to unexpected, catastrophic events: the case of airline stock returns and the September 11th attacks." Quarterly Review of Economics & Finance 44(4): 539-558.
- Chan, Y.-c., A. C. W. Chui, et al. (2001). "The impact of salient political and economic news on the trading activity." Pacific-Basin Finance Journal 9(3): 195-217.
- Charles, A. and O. Darné (2006). "Large shocks and the September 11th terrorist attacks on international stock markets." Economic Modelling 23(4): 683-698.
- Chen, A. H. and T. F. Siems (2004). "The effects of terrorism on global capital markets." European Journal of Political Economy 20(2): 349-366.
- Chen, D.-H., F.-S. Bin, et al. (2005). "The Impacts of Political Events on Foreign Institutional Investors and Stock Returns: Emerging Market Evidence from Taiwan." INTERNATIONAL JOURNAL OF BUSINESS 10(2).

quantiles are used from 0.10 to 0.90 quantiles. It explains the behavior of variables risk and return and dummy variable in three different earning periods i.e. low, medium and high earning period. In this study, nine quantiles from 0.10 to 0.90 represent three periods i.e. low earning period, medium earning period and high earning period. Results show the impact of events during these three periods. In OLS Regression outliers affects the results adversely. If we compare the results of Quantile Regression and OLS Regression, in OLS Regression only Indian nuclear test shows a significant negative impact on stock market returns, while remaining events have insignificant, while In Quantile Regression only three events have insignificant impact on stock market returns.

Pakistani economy suffered the cost of these events hardly, because these events increased market risk and reduction in trading activity.

Further research can be done on man-made events and natural events. Some studies support the notion that extreme events may have industry differential effect on stock returns so future research on sector level, firm level data will be beneficial, to investigate that the impact of different extreme events on different sector and firms.

References

- Aggarwal, R., C. Inclan, et al. (1999). "Volatility in Emerging Stock Markets." Journal of Financial and Quantitative Analysis 34(01): 33-55.
- Aktar, I. (2005). A Comparison of the Effects of the Chernobyl and Three Mile Island Nuclear Accidents on the US Electric Utility Industry. sosyoekonomi.
- Angbazo, L. A. and R. Narayanan (1996). "Catastrophic Shocks in the Property-Liability Insurance Industry: Evidence on Regulatory and Contagion Effects." The Journal of Risk and Insurance 63(4): 619-637.
- Anonymous (2009). Korean Investors Shrug Off Nuclear Test. Wall Street Journal: C.2.
- Apergis, N. and S. Eleptheriou (2001). "Stock Returns and Volatility: Evidence from the Athens Stock Market Index." JOURNAL OF ECONOMICS AND FINANCE 9(1): 50-61.
- Arin, K. P., D. Ciferri, et al. (2008). "The price of terror: The effects of terrorism on stock market returns and volatility." Economics Letters 101(3): 164-167.
- Arshad, M. U., D. S. M. A. Shah, et al. (2011). "Effects of Terrorism on Capital Market A Case Study of Pakistani Capital Market." Interdisciplinary Journal of Contemporary Research in Business 11: 202-209.
- Attiya, Y. J. and A. Ayaz (1999). "The Response of Karachi Stock Exchange to Nuclear Detonation." The Pakistan Development Review 38(4): 777-786.
- Ayodeji, O. R. (2009 Pp.). "Stock Return, Volatility And The Global Financial Crisis In An Emerging Market: The Nigerian Case." International Review of Business Research Papers 5(4): 426-447.
- Ayodeji, O. R. (2009 Pp.). "Stock Return, Volatility And The Global Financial Crisis In An Emerging Market: The Nigerian Case." International Review of Business Research Papers 5(4): 426-447.
- Bachelier, P. M. L. (1900). Th'eorie de la Sp'eculation. Department Of Mathematics, La Sorbonne University of Paris. PhD: 67.
- Baillie, R. T. and P. D. Ramon (1990). "Stock Returns and Volatility." The Journal of Financial and Quantitative Analysis 25(2): 203-214.
- Barros, C. P. and L. A. Gil-Alana (2009). "Stock market returns and terrorist violence: evidence from the Basque Country." Applied Economics Letters 16(15): 1575 - 1579.
- Barth, J. R., T. Li, et al. (2006). "Economic Impacts of Global Terrorism: From Munich to Bali." SSRN eLibrary.

- Barth, J. R., T. Li, et al. (2006). "Economic Impacts of Global Terrorism: From Munich to Bali Capital Studies, Milken Institute, Santa Monica, CA." SSRN eLibrary.
- Beaulieu, M.-C., J.-C. Cosset, et al. (2005). "The impact of political risk on the volatility of stock returns: the case of Canada." J Int Bus Stud 36(6): 701-718.
- Bekaert, G., C. R. Harvey, et al. (2001). "Emerging equity markets and economic development." Journal of Development Economics 66(2): 465-504.
- Blose, L. E., R. Bornkamp, et al. (1996). "Catastrophic events, contagion, and stock market efficiency: The case of the Space Shuttle Challenger." Review of Financial Economics 5(2): 117.
- Bollerslev, T. (1986). "Generalized autoregressive conditional heteroskedasticity." Journal of Econometrics 31(3): 307-327.
- Brounen, D. and J. Derwall (2010). "The Impact of Terrorist Attacks on International Stock Markets." European Financial Management 16(4): 585-598.
- By Jonathan, K. (1998). India's Bourse Turns Volatile After Skirting Turmoil for a Time. Wall Street Journal: 1.
- By Sara, W. (1998). Asian Stocks and Currencies Plummet --- Growing Violence In Indonesia Cited. Wall Street Journal: C.1.
- Cam, M.-A. (2008). "THE IMPACT OF TERRORISM ON UNITED STATES INDUSTRIES." Economic Papers 27(2): 115-134.
- Capelle-Blancard, G. and N. Couderc (2008). "What drives the market value of firms in the defense industry?" Review of Financial Economics 17(1): 14-32.
- Capelle-Blancard, G. and M.-A. Laguna (2010). "How does the stock market respond to chemical disasters?" Journal of Environmental Economics and Management 59(2): 192-205.
- Carter, D. A. and B. J. Simkins (2004). "The market's reaction to unexpected, catastrophic events: the case of airline stock returns and the September 11th attacks." Quarterly Review of Economics & Finance 44(4): 539-558.
- Chan, Y.-c., A. C. W. Chui, et al. (2001). "The impact of salient political and economic news on the trading activity." Pacific-Basin Finance Journal 9(3): 195-217.
- Charles, A. and O. Darné (2006). "Large shocks and the September 11th terrorist attacks on international stock markets." Economic Modelling 23(4): 683-698.
- Chen, A. H. and T. F. Siems (2004). "The effects of terrorism on global capital markets." European Journal of Political Economy 20(2): 349-366.
- Chen, D.-H., F.-S. Bin, et al. (2005). "The Impacts of Political Events on Foreign Institutional Investors and Stock Returns: Emerging Market Evidence from Taiwan." INTERNATIONAL JOURNAL OF BUSINESS 10(2).

- Chesney, M., G. Reshetar, et al. (2011) "The impact of terrorism on financial markets: An empirical study." Journal of Banking & Finance In Press, Corrected Proof.
- ChuliÁ. H., F. Climent, et al. (2009). "Volatility transmission patterns and terrorist attacks." Quantitative Finance 9(5): 607-619.
- Clark, E., O. Masood, et al. (2005). Political Events Affecting the Pakistan Stock Exchange AnAnalysis of the Past and Forecasting the Future. London, Kate Phylaktiś, Emerging Markets Group, Cass Business school: 8.
- Copeland, T. E. and J. F. Weston (1988). Financial Theory and Corporate policy Addison Wesley.
- Cummins, J. D. and C. M. Lewis (2003). "Catastrophic Events, Parameter Uncertainty and the Breakdown of Implicit Long-Term Contracting: The Case of Terrorism Insurance." Journal of Risk and Uncertainty 26(2): 153-178.
- Diamonte, R. L., J. M. Liew, et al. (1996). "Political Risk in Emerging and Developed Markets." Financial Analysts Journal 52(3): 71-76.
- Dillon, R. L., B. E. Johnson, et al. (1999). "Risk Assessment Based on Financial Data: Market Response to Airline Accidents." Risk Analysis 19(3): 473-486.
- Döpke. J. and C. Pierdzioch (2004). Politics and the Stock Market — Evidence from Germany, Kiel Institute for the World Economy.
- Drakos. K. (2009). Cross-country Stock Market Reactions to Major Terror Events: The Role of Risk Perception. Economics of Security Working Paper 16, Berlin: Economics of Security Berlin. 16.
- FAMA. E. F. (1970). "EFFICIENT CAPITAL MARKETS: A REVIEW OF THEORY AND EMPIRICAL WORK." The Journal of Finance 25(2): 383-417.
- Fields, M. A. and V. Janjigian (1989). "The effect of Chernobyl on electric-utility stock prices." Journal of Business Research 18(1): 81-87.
- Fink, J. D., K. E. Fink, et al. (2010). "When and how do tropical storms affect markets? The case of refined petroleum." Energy Economics In Press, Corrected Proof.
- Fowdar. S. and C. Koonjal (2008). An Assessment Of The Impact Of Economic And Political News On Returns And Liquidity Of The Stock Exchange Of Mauritius. EABR & TLC Conference, Rothenburg, Germany.
- GIRO (2002). Extreme events part 2. Financial catastrophes, The overthrow of modern financial theory, GIRO Convention General Insurance Study Group - London. Paris, GIRO Convention General Insurance Study Group
- Glosten, L. R., R. Jagannathan, et al. (1993). "On the Relation between the Expected Value and the Volatility of the Nominal Excess Return on Stocks." The Journal of Finance 48(5): 1779-1801.

- Chesney, M., G. Reshetar, et al. (2011) "The impact of terrorism on financial markets: An empirical study." Journal of Banking & Finance **In Press, Corrected Proof**.
- Chuliá, H., F. Climent, et al. (2009). "Volatility transmission patterns and terrorist attacks." Quantitative Finance **9(5): 607-619**.
- Clark, E., O. Masood, et al. (2005). Political Events Affecting the Pakistan Stock Exchange An Analysis of the Past and Forecasting the Future. London, Kate Phylaktis, Emerging Markets Group, Cass Business school: 8.
- Copeland, T. E. and J. F. Weston (1988). Financial Theory and Corporate policy Addison Wesley.
- Cummins, J. D. and C. M. Lewis (2003). "Catastrophic Events, Parameter Uncertainty and the Breakdown of Implicit Long-Term Contracting: The Case of Terrorism Insurance." Journal of Risk and Uncertainty **26(2): 153-178**.
- Diamonte, R. L., J. M. Liew, et al. (1996). "Political Risk in Emerging and Developed Markets." Financial Analysts Journal **52(3): 71-76**.
- Dillon, R. L., B. E. Johnson, et al. (1999). "Risk Assessment Based on Financial Data: Market Response to Airline Accidents." Risk Analysis **19(3): 473-486**.
- Döpke, J. and C. Pierdzioch (2004). Politics and the Stock Market — Evidence from Germany, Kiel Institute for the World Economy.
- Drakos, K. (2009). Cross-country Stock Market Reactions to Major Terror Events: The Role of Risk Perception. Economics of Security Working Paper 16, Berlin: Economics of Security Berlin. 16.
- FAMA, E. F. (1970). "EFFICIENT CAPITAL MARKETS: A REVIEW OF THEORY AND EMPIRICAL WORK." The Journal of Finance **25(2): 383-417**.
- Fields, M. A. and V. Janjigian (1989). "The effect of Chernobyl on electric-utility stock prices." Journal of Business Research **18(1): 81-87**.
- Fink, J. D., K. E. Fink, et al. (2010). "When and how do tropical storms affect markets? The case of refined petroleum." Energy Economics **In Press, Corrected Proof**.
- Fowdar, S. and C. Koonjal (2008). An Assessment Of The Impact Of Economic And Political News On Returns And Liquidity Of The Stock Exchange Of Mauritius. EABR & TLC Conference, Rothenburg, Germany.
- GIRO (2002). Extreme events part 2. Financial catastrophes, The overthrow of modern financial theory, GIRO Convention General Insurance Study Group - London. Paris, GIRO Convention General Insurance Study Group
- Glosten, L. R., R. Jagannathan, et al. (1993). "On the Relation between the Expected Value and the Volatility of the Nominal Excess Return on Stocks." The Journal of Finance **48(5): 1779-1801**.

- Gul, T., A. Hussain, et al. (2010). "Impact of Terrorism on the Financial Markets of Pakistan." European Journal of Social Sciences – Volume 18, Number 1 (2010) 18(1).
- Guzhva, V. (2008). "Applying intervention analysis to financial performance data: The case of US airlines and September 11th." Journal of Economics and Finance 32(3): 243-259.
- Hammoudeh, S. and H. Li (2008). "Sudden changes in volatility in emerging markets: The case of Gulf Arab stock markets." International Review of Financial Analysis 17(1): 47-63.
- Hellström, J. and A. Soultanaeva (2010). The Impact of Stock Market Jumps on Time-Varying Return Correlations: Empirical Evidence from the Baltic Countries, Umeå University, Department of Economics.
- Herron, M. C., J. Lavin, et al. (1999). "Measurement of Political Effects in the United States Economy: A Study of the 1992 Presidential Election." Economics and Politics 11(1): 51-81.
- Hill, J. and T. Schneeweis (1983). "The Effect of Three Mile Island on Electric Utility Stock Prices: A Note." The Journal of Finance 38(4): 1285-1292.
- Homan, A. C. (2006). "The Impact of 9/11 on Financial Risk, Volatility and Returns of Marine Firms." Maritime Econ Logistics 8(4): 387-401.
- Homan, A. C. (2009). "The Impact of 9/11 on the Persistence of Financial Return Volatility of Marine Firms." Eastern Economic Journal 35: 71-83.
- Huang, A. Y. (2011). "Volatility forecasting by quantile regression." Applied Economics.
- Ito, H. and D. Lee (2005). "Assessing the impact of the September 11 terrorist attacks on U.S. airline demand." Journal of Economics and Business 57(1): 75-95.
- James, T. A. and O. Chris (2006). South Korea Stocks Fall on Test Claim; China Is Unfazed. Wall Street Journal: C.10.
- Javid, A. Y. (2007). Stock Market Reaction to Catastrophic Shock: Evidence from Listed Pakistani Firms, PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS, ISLAMABAD.
- Jeremiah, M. (2008). U.S. Woes Weigh On Asian Markets; Global Stocks Fall As Gustav Hits. The Washington Post: E.9.
- Kalra, R. and G. V. Henderson Jr (1993). "Effects of the Chernobyl nuclear accident on utility share prices." Quarterly Journal of Business & Economics 32(2): 52.
- Karolyi, G. A. (2001). Why Stock Return Volatility Really Matters.
- Koenker, R. and G. Bassett, Jr. (1978). "Regression Quantiles." Econometrica 46(1): 33-50.
- Kollias, C., S. Papadamou, et al. "Terrorism and capital markets: The effects of the Madrid and London bomb attacks." International Review of Economics & Finance 20(4): 532-541.

- Lamb, R. P. (1998). "An examination of market efficiency around hurricanes." Financial Review 33(1): 163-172.
- Lin, C.-T. and Y.-H. Wang (2007). "The impact of party alternative on the stock market: the case of Japan." Applied Economics 39(1): 79 - 85.
- Longin, F. M. (1996). "The Asymptotic Distribution Of Extreme Stock Market Returns." The Journal Of Business 69(3): 383-408.
- Maillet, B. B. and T. L. Michel (2005). "The Impact of the 9/11 Events on the American and French Stock Markets." Review of International Economics 13(3): 597-611.
- Maloney, M. T. and J. H. Mulherin (2003). "The complexity of price discovery in an efficient market: the stock market reaction to the Challenger crash." Journal of Corporate Finance 9(4): 453-479.
- Mehdian, S., T. Nas, et al. (2008). "An examination of investor reaction to unexpected political and economic events in Turkey." Global Finance Journal 18(3): 337-350.
- Milburn, J. A. (2008). "The Relationship between Fair Value, Market Value, and Efficient Markets*." Accounting Perspectives 7(4): 293-316.
- Mollah (2009). "Stock return and volatility in the emerging stock market of Bangladesh." Journal of the Academy of Business and Economics.
- Narayanan, L. A. A. a. R. (1996). "Catastrophic Shocks in the Property- Liability Insurance Industry: Evidence on Regulatory and Contagion Effects." The Journal of Risk and Insurance 63(4): 619-637.
- Nguyen, A. P. and C. E. Enomoto (2009). "Acts Of Terrorism And Their Impacts On Stock Index Returns And Volatility: The Cases Of The Karachi Stock Exchange." The International Business & Economics Research Journal 8(12): 75.
- Niederhoffer, V. (1971). "The Analysis of World Events and Stock Prices." The Journal of Business 44(2): 193-219.
- Nikkinen, J. and S. Vähämaa (2010). "Terrorism and Stock Market Sentiment." Financial Review 45(2): 263-275.
- Nimkhunthod, W. (2007). An Impact of Political Events on the Stock Exchange of Thailand, THAMMASAT UNIVERSITY, BANGKOK, THAILAND. **MASTER OF SCIENCE PROGRAM IN FINANCE.**
- Park, B.-J. (2002). "On the Quantile Regression Based Tests for Asymmetry in Stock Return Volatility." Asian Economic Journal 16(2): 175-191.
- Peter, A. M. (2006). Dow, Nasdaq Shrug Off North Korea, While Dollar Increases on the Yen. Wall Street Journal: C.1.
- Poon, S.-H. and C. W. J. Granger (2003). "Forecasting Volatility in Financial Markets: A Review." Journal of Economic Literature 41(2): 478-539.

- Ramiah, V., M.-A. Cam, et al. (2010). "Changes in equity returns and volatility across different Australian industries following the recent terrorist attacks." Pacific-Basin Finance Journal 18(1): 64-76.
- Relly, F. and K. Brown (1997). Investment Analysis and Portfolio Management Philadelphia San Diego, Dryden Press.
- Roll, R. (1992). "Industrial Structure and the Comparative Behavior of International Stock Market Indices." The Journal of Finance 47(1): 3-41.
- Rubinstein, M. (1975). "Securities Market Efficiency in an Arrow-Debreu Economy." The American Economic Review 65(5): 812-824.
- Schwert, G. W. (1989). "Why Does Stock Market Volatility Change Over Time? ." Journal of Finance 44(2): 1115-1153.
- Sewell, M. (2008). History of the Efficient Market Hypothesis, University College London: 23.
- Shelor, R. M., D. C. Anderson, et al. (1990). "The Impact of the California Earthquake on Real Estate Firms' Stock Value." Journal of Real Estate Research 5(3): 335.
- Shelor, R. M., D. C. Anderson, et al. (1990). "The Impact of the California Earthquake on Real Estate Firms' Stock Value." Journal of Real Estate Research 5(3).
- Shelor, R. M., D. C. Anderson, et al. (1992). "Gaining from Loss: Property-Liability Insurer Stock Values in the Aftermath of the 1989 California Earthquake." The Journal of Risk and Insurance 59(3): 476-488.
- Stractmans, S. T. M., W. F. C. Verschoor, et al. (2008). "Extreme US stock market fluctuations in the wake of 9/11." Journal of Applied Econometrics 23(1): 17-42.
- SÜER, M. B. Ö. (2008). "THE EFFECT OF MARMARA EARTHQUAKE ON FINANCIAL INSTITUTIONS " Doğuş Üniversitesi Dergisi 9(2): 11.
- Suhardjo, I. I. H. (2001). The Impact of Domestic Political Events on an Emerging Stock Market : The Case of Indonesia. Asia Pacific Management Conference.
- Sweeney, R. J. and J. Zhang (1999). "India and Pakistan Go Nuclear: The Economic Costs for India, Pakistan — and China." Review of Pacific Basin Financial Markets and Policies 2(3): 341-373
- Valadkhani, W. a. (2004). "Measuring the impact of natural disasters on capital markets: an empirical application using intervention analysis." Applied Economics 36: 11.
- Walker, T. J., D. J. Thiengtham, et al. (2005). "On the Performance of Airlines and Airplane Manufacturers Following Aviation Disasters." Canadian Journal of Administrative Sciences / Revue Canadienne des Sciences de l'Administration 22(1): 21-34.

- Wong, S. Q. and R. J. Lievano (2009). "INVESTOR SENTIMENT AS INTERVENTION OF STOCK MARKET RETURNS." Academy of Accounting and Financial Studies Journal 13(4): 55-66.
- Xin-li, G. (2010). The Impact of the May 12 Wenchuan Earthquake on China's Stock Market International Conference on Management Science & Engineering (17th).
- Xing, X. (2004). "Why Does Stock Market Volatility Differ across Countries? Evidence from Thirty-Seven International Markets." SSRN eLibrary 9(1).
- Yanase, N. and Y. Yasuda (2010). "The Impact of the September 11 Terrorist Attack on the Global Insurance Markets: Evidence from the Japanese Property-Casualty Insurance Industry." Journal of Insurance Issues 33(1): 85-107.

Appendix A

"[Click and type appendix title]"

