Impact of Terrorism, Political System and Exchange Rate Fluctuations on Stock Market Volatility

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Abstract

Terrorism, political system instability and currency rate fluctuations are the three most evident issues of 21st century. In this study, comparative analysis is performed to check the impact of all these issues on PSX Volatility. EGARCH (1,1) approach is used on four different kinds of data collected from 1st January 2000 to 31st December 2015. Terrorist events, FX return fluctuations with restoration of democratic political system in Pakistan are considered in this study. Results confirm that democratic political government reduces PSX volatility while terrorism increases it. Terrorist attacks are categorized into various categories. Event day analysis confirms that Pakistan stock market (PSX) is efficient enough to absorb the effects of terrorist attack within a day. Holding portfolios and performing arbitrage activities by the investors diversify the risks due to foreign exchange (FX) fluctuations which show no significant impact on PSX volatility.

Keywords

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Introduction

New millennium opens doors for several crises in this world especially in developing countries. Out of all those three most evident types of problems are terrorism, foreign exchange (FX) fluctuations and political system crisis. All this crises affect the country's performance in varying ways which is evidently depicted through economic measures. Stock market is the economic barometer of a country. It shows reaction in the form of price movement for adjustment. When there is abnormal movement in market as compared to averge rate of market movement, it is termed as volatility (Feinstein, 1987). It becomes need of the day to model the phenomenon of stock market volatility, because it increases risk as well as demand for risk premium. However, investor's compensation and free market operations decrease due to high volatility (Smith, 1988).

The temporal routine of equity market volatility forces the researchers to ascertain factors responsible for high volatilities. Factors like financial markets variations (FX fluctuations), macroeconomic changes (like political system changes) and occurrence of surprise events (like terrorist event) are responsible for stock market volatility (Mnasri & Nechi, 2016; Nelson, 1991; Pástor & Veronesi, 2013; Walid, Chaker, Masood, & Fry, 2011).

In past studies, above mentioned factors are individually considered to investigate their impact on stock market volatility. Predominantly developed markets are studied, however, few studies were also conducted on emerging markets (Aslam, 2014; Mnasri & Nechi, 2016; Pástor & Veronesi, 2013; Walid et al., 2011). According to the best of author's knowledge, no comparative study has been conducted to evaluate the impact of these three factors on volatility of stock markets of emerging economies. This study is comprehensively contributing to the existing body of literature by focusing on Pakistan Stock Exchange (PSX) affected due to domestic political issues, FX return fluctuations and terrorist events (specially focusing on domestic and foreign terrorism along with other terrorism dimensions mentioned in Table 1).

PSX is considered in this study, because Pakistan is the third most severely affected country due to terrorism (GTD, 2016). Figure 1 shows the increasing number of terrorist events and their intensity which increase market volatility (Aslam, 2014). Secondly, Pakistan is on the 192nd position out of 194 on political stability index for the year 2015. Multiple times military take control of entire administrative affairs of the country. The switching of political system generates a political risk which affects stock market volatility (Pástor & Veronesi, 2013). Figure 2 shows consistently falling domestic currency value with respect to dollar. This fluctuation in currency value increases exchange rate risk which is translated to market volatility (Walid et al., 2011). However, PSX is the emerging market with total market capitalization in June 2017 reached to 9,696,804.79 million rupees with an average daily turnover of 335.54 million shares and 16,918.62 million rupees.
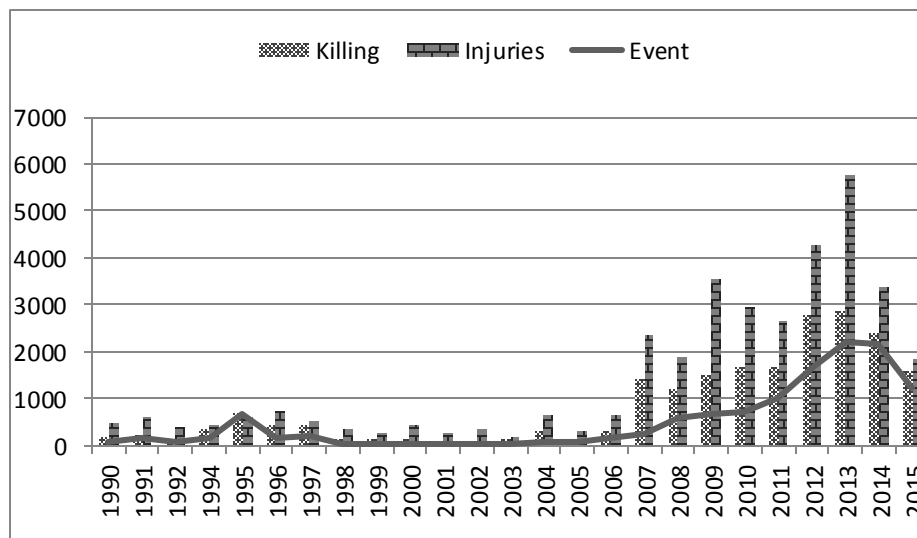

Figure 1. Numbers of killing, injuries and events in Pakistan (1990 to 2015) Source: Global Terrorism Database 2016
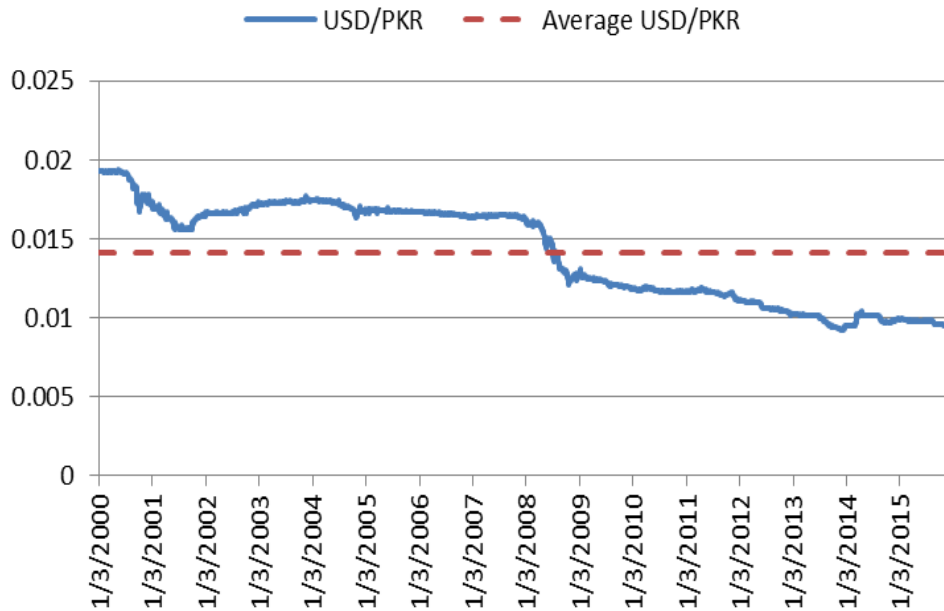
Figure 2. Foreign exchange rate of Pakistan Source: Business Recorder

Major finding of the study confirmed that, PSX volatility is massively affected because of unstable domestic political system and terrorism. Terrorism within the boundaries of a country takes place in any city in the form of armed assault, bombing and suicide attacks while targeting business organizations, government, educational institutions, security forces and religious institutions by using explosives, firearms and unique arms and ammunition increase the volatility of the PSX on event day but the market inbuilt resilience absorbs the effect so it recovers back on next day. Along with that terrorism in Pakistan, its major trading partner countries also increase PSX volatility confirming that terrorism induces contagion effect.

Table 1 .Classification & Frequency Distribution of Terrorist Events

EVENT TYPES	NUMBER OF EVENTS	Total Events
Foreign	2041	4490
Domestic	2449	
TYPES OF WEAPON (Domestic events only)		
Explosives	1569	
Firearms	738	2449
Incendiary	37	
Others	105	
TYPES OF CITIES (Domestic events only)		
Big cities without stock (WMBC)	484	
Cities with stock market (SMC)	387	2449
Other cities (WMSC)	1578	
Type Terrorist Of Attack (Domestic events only)		
Suicide	143	
Hostage kidnap	139	
Infrastructure	49	
Assassination	170	2449
Bombing	1339	
Armed assault	572	
Others	37	
Type Of Target (Domestic events only)		
Security forces	459	
Transportation	111	
Religious figures	108	
Private citizens property	594	
Government	221	2449
Educational institutions	227	
Business	252	
Others	477	
Attacks In Provinces (Domestic events only)		
Sindh	366	
Punjab	159	
KyberPakhtunKhwa (KPK)	718	
Gilgit	11	2449
Fata	394	
Baluchistan	797	
Azad Kashmir	4	

Literature Review

Markets were positioned at the peak of the symmetric pyramid. Here information was combined and reactions were recorded for adjustments. Reactions were observed in the form of price movements confirmed by random walk theory of Regnault (1863). Market showed reaction to all the news and events on a random basis (Regnault, 1863). No one could judge market in future and no one can beat it today (Fama, 1965). Competition among well-informed participants improved information management system which resulted in information based price reflection. This price reflection was based on the past and present available information along with a translation of future expectations (Fama, 1965; Fama, Fisher, Jensen, & Roll, 1969). It led us to the efficient market theory of Malkiel and Fama (1970). This study uses this theory to analyze how equity market shows information based reactions, when information of political system change, FX fluctuation and terrorist event hit the market.

Next section deliberated on literature related to stock market reaction because of each of the three issues discussed separately.

Literature Related to Political System Changes

A political system was composed of collaboration between different political segments which directly affected the stock market performance by designing new policies and regulatory frameworks. Investors, businessmen, and common people showed reactions either in favor or against the existing and new political system which resulted in huge fluctuations in markets (Bittlingmayer, 1998). There were many flaws in democratic political system especially in initial stages. It was evident that democratic countries had highly unproductive use of factors of production which hurt investor confidence and resulted in increased stock market volatility (Quinn & Woolley, 2001; Rodrik, 2000). It was confirmed that frequently changing political system due to several military coups and FX restrictions in Philippine between 1987 and 2000 increased Philippian stock market volatility (Bautista,

2003). People developed trust on prevailed political system over time and demanded stable political system whether its nature was democratic or authoritarian. Rapidly changing political system led to increasing political risk by increasing political uncertainty that increased volatility in Canadian stock market. It also forced investors to claim more risk premiums which were very high in developing countries (Beaulieu, Cosset, & Essaddam, 2005; Pástor & Veronesi, 2013). Political unrest was vividly observed in Arab countries that affected MENA region equity markets (Chau, Deesomsak, & Wang, 2014). Nazir, Younus, Kaleem, and Anwar (2014) studied the impact of domestic political event on PSX. Results confirmed that nature of political events confirms the direction of PSX.

Literature Related to Foreign Exchange Movement

Adoption of floating exchange rate increased volatility in FX market. FX fluctuations triggered transaction and economic exposures which directly affected stock market performance (Ma & Kao, 1990). Economies specially emerging ones adopted different economic policies over time which led to FX fluctuations (Abdalla & Murinde, 1997). These fluctuations vibrantly hurt stock market performance in normal condition. However, if investors hold portfolios, then FX fluctuations effect on stock market significantly decreased (Abdalla & Murinde, 1997). Kanas (2000) further extended Abdalla and Murinde's study (1997) and proved that the relationship flowing from FX fluctuations to stock market volatility observed in developing economies exists only because of inefficient portfolios held by investors. Factors like FX regimes, trade volume, volume of the equity market and capital flow regulations which were responsible to develop dynamic link between the FX and stock markets varied across the economies (Pan, Fok, & Liu, 2007). However, FX price movement was the determining factor of Malaysian stock prices (Rahman, Sidek, & Tafri, 2009). A bidirectional relationship was found between FX market and Turkish stock market (Aydemir & Demirhan, 2009). However, Kutty (2010) studied Mexican markets and confirmed that in short run

there is only a unidirectional relationship flowing from FX market to Mexican stock market. Walid et al. (2011) studied four emerging countries stock markets and proved that stock markets asymmetrically responded to FX fluctuations. It was proved this relationship also varied on the basis of regime which may be either normal or a crisis.

Literature Related to Terrorist Event

Paradigm shift was observed in traditional focus of research after 9/11 terrorist attacks. Terrorism significantly increased stock market volatility (Bautista, 2003). Chen and Siems (2004) investigated global and US market performance against terrorist activities. Results confirmed that market fluctuations were significantly high in both markets but markets developed resilience over time. Industry specific analysis on US Airline industry performance after 9/11 attacks confirmed increased volatilities because of increased systematic and idiosyncratic risks due to terrorism (Drakos, 2004). After 9/11 attacks, global markets faced massive volatilities across markets and sectors (Charles & Darné, 2006). Terrorism caused huge volatilities due to absence of effective regulatory supervision and diversified liquid financial markets (Johnston & Nedelescu, 2006). Abadie and Gardeazabal (2008), and Arin, Ciferri, and Spagnolo (2008) proved that terrorism had significant impact on stock markets volatility because of increased allocation of productive resources to defensive purposes and increased capital flight due to decrease in return on investment. Terrorism related contagion effect was also confirmed in these studies. Terrorist events had psychosocial effects on survivors. Higher psychosocial effects of any terrorist attack resulted in high market volatility and vice versa (Drakos, 2010).

Emerging markets also exhibit similar reaction to terrorism like developed markets. Karachi Stock Exchange (KSE)† and Tehran Stock Exchange (TSE) volatility significantly increased due to terrorism but

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[1]KSE is now Pakistan Stock Exchange (PSX)

KSE was more volatile than TSE (Nguyen & Enomoto, 2009). However, US financial crisis was at peak and domestic socio-political conditions of Pakistan were worse too, which robed the domestic financial sector resilience to absorb such distresses as discussed in Chen and Siems (2004). Asymmetric behavior of market was also not considered for analysis in this study. Aslam (2014) confirmed that Pakistan equity market showed asymmetric volatility behavior using EGARCH(1,1). Only terrorism induced market volatility was checked in this study while other political and economic factors were not considered. Mnasri and Nechi (2016) studied 12 MENA region countries and confirmed that terrorism induced volatility lasted long in developing countries than developed countries.

This study is distinguished from all previous studies in two ways. Firstly, there was no comparative analysis performed in the past to evaluate the impact of political system changes, FX fluctuations and terrorism on stock market volatility of Pakistan. Secondly, no comparative analysis had been performed to evaluate either domestic terrorist event caused more volatility or foreign terrorist events.

Methodology and Analysis

Data

Four types of data are collected from different sources. First, terrorism related data are collected from Global Terrorism Database. Terrorist events are considered from 1st January 2000 till 31st December 2015. Multiple events on a single day are considered as a single event. The event took place when the market is closed (Saturday, Sunday or after 3:30 pm on any day); its impact is tested on next working day. There are total 2449 domestic terrorist events passed through this check point. Foreign terrorist events are selected from major trading partners of Pakistan after following above mentioned criteria. Pakistan's major trading partners are USA, UK, China, Germany, India, Russia, France and Saudi Arabia. There are total 2041 foreign terrorist events passed through this check point.

Second type of data daily Pakistan stock market index data collected from Yahoo Finance from 1st January 2000 till 31st December 2015 consisting of 4174 observations. Third type of data are daily foreign exchange rate data collected from Business Recorder. Rupees to US dollar quotes are used to calculate FX returns. Fourth type of data are about the restoration of the democratic political system in Pakistan. A dummy variable is created to capture this phenomenon. From 1st January 2000 to 11th October 2002, it took value "0" which showed military authoritarian regime while after that till 31st December 2015 it took value "1" which showed democratic regime in Pakistan.

Pre-Estimation Analysis

Nelson (1991) mentions that to estimate volatility of market indices just taking natural logarithmic difference of today's price from yesterday's price do not cause any significant error. Daily stock and FX returns are generated using Equation 1.

$$R_{i,t} = \ln(P_t/P_{t-1}) \qquad (1)$$

Where R shows returns while i means market both stock or FX and t represents the time period. Here Pt represents current day closing price and Pt-1 means yesterday closing price.

Descriptive Statistics

Table 2 shows the descriptive statistics of PSX returns and FX returns during the study time period. Mean return from PSX is 0.0752% ranges from -4.53% to 4.68%. Standard deviation is around 1.31%. Jarque-Bera statistics confirmed the normal distribution of the data. Similarly, mean FX return is -0.0169% ranges from -0.0173% to 1.167%. Standard deviation is around 0.3384%. Jarque-Bera statistics confirmed the normal distribution of the data. Standard deviation is low for FX market. This unusual behavior of domestic FX market is due to huge dollar inflows observed in Pakistan in form of aids and loans. This inflow increases dollar's supply as a result of which fluctuations are normalized.

Table 2. Descriptive Statistics

	PSX Returns	FX
Mean	0.000752	-0.000169
Median	0.00075	-0.00017
Maximum	0.04688	0.01167
Minimum	-0.04538	-0.01201
Std. Dev.	0.013187	0.003384
Skewness	1.49E-05	-0.000131
Kurtosis	2.962207	2.962276
Jarque-Bera	0.248342	0.247455
Probability	0.883229	0.883621
Observations	4174	4174

Stationary Test

Table 3 indicates the results of Augmented Dickey Fuller (ADF) unit root test. Result shows that data are stationary when tested without trend and intercept, with intercept only and with trend only. The values *,**,*** shows significance at 10%, 5% and 1%. It is confirmed that PSX returns and FX returns are stationary at level.

Table 3. Augmented Dickey-Fuller (ADF)Test Statistic

PSX RETURN					
Test Models	t-Statistic	Prob.*	1% level	5% level	10% level
Intercept	-57.5535***	0.0001	-3.431734	-2.862036	-2.567077
Trend & Intercept	-57.5406***	0.0000	-3.960239	-3.410882	-3.127244

No Trend	-57.3586***	0.0001	-2.565517	-1.940900	-1.616649
FX RETURN					
Intercept	-51.9505***	0.0001	-3.431734	-2.862037	-2.567078
Trend & Intercept	-51.9504***	0.0000	-3.960240	-3.410883	-3.127244
No Trend& Intercept	-76.9981***	0.0001	-2.565517	-1.940900	-1.616649

Note: (*),(**) and(***) shows significance at 10%, 5% and 1%

Volatility Clustering

Daily natural logarithmic returns from 1st January 2000 to 31st December 2015 are plotted in Figure 3. Returns are not identically and independently distributed through time. There are periods of low volatility followed by period of low volatility and periods of high volatility followed by period of high volatility. It shows the existence of volatility clustering.
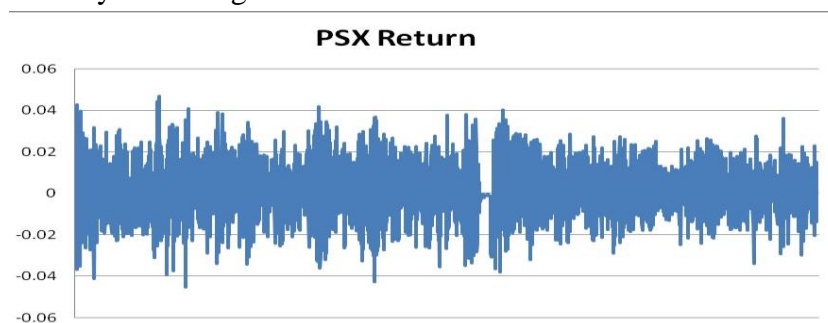

Figure 3. Volatility Clustering

ARCH Effect

Before proceeding further for EGARCH, ARCH effect is checked on the PSX return data. Equation 2 is used to run OLS regression to collect

residual. After getting residual, auxiliary regression is run using Equation 3. Table 4 results confirmed the presence of ARCH effect by rejecting the null hypothesis of homoscedasticity. This enables us to apply GARCH family models on the data.

$$R_{PSE,t} = \alpha + \beta_1 R_{PSE,t-1} + \in_x \qquad (2)$$

$$\in_t^2 = \alpha + a_1 \in_{t-1}^2 + a_2 \in_{t-2}^2 + a_3 \in_{t-p}^2 + v_t \qquad (3)$$

Table 4.ARCH Effect Test

ARCH Effect Test			
F-statistic	548.0507	Prob. F(1,4170)	0.0000
Obs*R-squared	484.6212	Prob. Chi-Square(1)	0.0000

Exponential GARCH (EGARCH) Model

$$\log(h_t^2) = \omega + a\,|z_{t-i}| - E(|z_{t-i}|)) + \gamma z_{t-i} + \partial \ln(h_{t-1}^2) \qquad (4)$$

EGARCH is the most updated model in GARCH family (Nelson, 1991). It is proficient to handle asymmetries of market as well as the TGARCH. Here, variance depends on both size and sign of lagged residuals. Model imposes non-negativity constraints on parameters. Leverage effect is exponential. In Equation 4, ω, a, γ and ∂ are the conditional variance parameters. γ represents the asymmetric behavior of market. Negative significant value of γ authenticates that bad news caused more volatility than good news. ∂ represents weight of previous day conditional variance in measuring t day conditional volatility. a represents weight of previous day standardized residuals in measuring t day conditional volatility.

In this study, EGARCH (1,1) model is applied because according to Eldor and Melnick (2004) markets have in-built mechanism to achieve efficiency that is why only yesterday's market returns and standard deviations are considered (Aslam, 2014).

Equation 5 shows the extension of the model that incorporates other exogenous factors that possibly affect the stock market volatility

including the democratic political system in the country (β), FX returns (π) and terrorist event (τ_i) affecting the market volatility. β, π and τ_i are the parameters. Due to various classifications of terrorism (see Table 1), it has subscript i.

$$\log(h_t^2) = \omega + a\,|z_{t-i}| - E(|z_{t-i}|)) + \gamma z_{t-i} + \partial \ln(h_{t-1}^2)$$
$$+ \beta Democratic\ System_t + \pi Forex\ Volatilities_t + \sum_{i=i}^{n} \tau_i\ Terrorism_{i,t} \tag{5}$$

Findings and Discussion

FX fluctuation shows no significant impact on PSX volatility because domestic investors hold international portfolios to diversify their risk. Different FX rates provide the arbitrage opportunity that minimize their fluctuation effect on PSX volatility to negligible level (Granger, Huangb, & Yang, 2000). Democratic political system decreases PSX volatility because people see their elected representatives develop such policies which are beneficial for general public (Bautista, 2003; Nazir et al., 2014; Nguyen & Enomoto, 2009). Overall analysis also confirms the asymmetric behavior of PSX market. It means that in reaction to bad news like terrorist event and political instability, investors are more negatively affected than good news. Coefficients with *, **, *** denote significance at the 10%; 5%; and 1% level, respectively.

Types of Terrorism

Table 5 (Section A) shows that the effect of different types of terrorism on stock market volatility. Our result shows that domestic terrorist activities significantly increase the volatility which is consistent with Ramiah and Graham (2013). This study confirms the existence of terrorism induced contagion effect because of market integration. Trading, financial and other business activities are affected due to domestic as well as cross border terrorisms which ultimately depicted on PSX markets volatility. There is a need to develop a comprehensive, well verses counter terrorism policy by Pakistan and its trading partner to eradicate negative effect of domestic and foreign terrorism.

Types of Terrorist Attacks

Table 5 (Section B) shows the effects of different types of domestic terrorist attacks on PSX volatility. Suicide attacks and bombings cause significant increase in PSX volatility which is consistent with Eldor and Melnick (2004). Suicide attacks have severe and highest impact with β(Suicide)=0.1366 with significance at 1%. Suicide attacks create long lasting psychological effect because it directs policy makers towards new breed of terrorists who are willing to die and cause maximum human and infrastructure damage.

Terrorist event in the form of bombing with β(Bombing)=0.0609 with significance at 5%. In this type of terrorist attack, bomber's intention is to protect himself and cause maximum human and infrastructure damage. It also increases the chances of future bombing event. Armed assault increases volatility of PSX with β(Armed assault)=0.0609 with significance at 10%.

Table 5 . (EGARC Analysis)

Variables	Coefficient	Prob.		
ω	-1.073680***	0.0000		
α	0.325632***	0.0000	Section "A"	
γ	-0.088818***	0.0000		
∂	0.903812***	0.0000	Akaike info criterion	-5.999026
Foreign	0.038161***	0.0054	Schwarz criterion	-5.983842
Domestic	0.093627***	0.0000	Hannan-Quinn criter.	-5.993656
Democracy	-0.084251***	0.0000		
F. Exchange	1.607588	0.4251		
ω	-1.079175***	0.0000		
α	0.324961***	0.0000	Section "B"	
γ	-	0.0000		

	0.088261***			
∂	0.903625***	0.0000	**Akaike info criterion**	**- 5.998748**
Armed Assault	0.074018*	0.0775	**Schwarz criterion**	**- 5.979009**
Assassination	0.055990	0.4295	**Hannan-Quinn criter.**	**- 5.991767**
Bombing	0.060863**	0.0182		
Suicide Attack	0.136615***	0.0033		
Others	0.138654	0.4032		
Democracy	- 0.086229***	0.0000		
F. Exchange	1.425405	0.5059		
ω	- 1.049319***	0.0000		
α	0.326526***	0.0000	**Section "C"**	
γ	- 0.085870***	0.0000		
∂	0.906958***	0.0000	**Akaike info criterion**	**- 5.997442**
Baluchistan	0.112168***	0.0002	**Schwarz criterion**	**- 5.976184**
Gilgit	0.402007	0.3955	**Hannan-Quinn criter.**	**- 5.989923**
KPK	0.123068***	0.0000		
Islamabad	0.194614***	0.0000		
Punjab	0.342067***	0.0000		
Sindh	0.153385***	0.0000		
Fata	0.031788	0.4557		
Democracy	-0.031801**	0.0214		
F. Exchange	0.055990	0.4295		

Note: (*),(**) and(***) shows significance at 10%, 5% and 1%

There are 572 armed assault events with prime objective to cause physical harm to humans. Investors doubted security conditions more when such terrorist attack increases in number. It is clear indication that terrorist easily carries explosives, arms and ammunitions to perform the attacks. Government needs to focus on how to overcome these attack types at first priority.

Provincial Terrorism

Table 5 (Section C) confirms that terrorist event in any province of Pakistan (except Gilgit and FATA) severely increases volatility of PSX. Very few terrorist events take place in Gilgit territory. While FATA constitutes of tribal areas operated under tribal customs. People are very much desensitized to such events because inter-tribal conflicts are quite common. Also, there is no major business activity taking place in FATA territory. These are the possible reasons for insignificance results in FATA and Gilgit region. Terrorist attacks in Punjab have $\beta=0.342067$ with significance at 1%. It severely increases volatility of PSX in comparison with volatility created by terrorist attacks in Islamabad β(Islamabad)=0.1946), Sindh (β(Sindh)=0.1534), Khyber Pakhtunkhwa (β(KPK)=0.1231) and Baluchistan (β(Baluchistan)=0.1231.

Type of City (Location of Attack)

Table 6 (Section A) show the effects of city based classifications of terrorist activities across Pakistan on PSX volatility. It confirms that location of terrorist attack matters a lot. Terrorism in cities with stock markets (SMC) such as Islamabad, Karachi, and Lahore has β(SMC)=0.1693 with significance at 1% increases PSX volatility. Majority of the events take place in without stock market small cities (WMSC). These cities are the safe havens for terrorists who are active in domestic and cross border terrorism. These cities contain natural resources in abundance and located near provincial and international borders, which create hurdles in domestic and international trade. So terrorist event in the WMSC (β(WMSC)=0.0683 with significance at 1%) increases PSX volatility. Several cities of Southern Punjab, KPK and Baluchistan fall in this category.

Big cities without stock market (WMBC) like Hyderabad, Peshawar, Multan, Faisalabad, etcetera has β(WMBC)=0.0578 with significance at 1% increases PSX volatility. There are 484 events taken place in WMBC which are severe in terms of human causalities and infrastructure damage. Infrastructure damages have long-term impact

on the market, because it reduces productivity and exports that intensify BOP issues. Now, government needs to develop security measures on periority basis for SMC, WMBC and WMSC to reduce terroritsm induced market volatility.

Types of Weapons Used

Terrorist use numerous tools to create fear. These are mainly categorized into explosives, firearms, incendiary and others. Table 6 (Section B) shows the effect of different types of weapons used in terrorist activity on PSX volatility. Explosives (like bomb and dynamite) have β(Explosive)=0.0539 with significance at 5% increase PSX volatility. Use of explosive materials increase the severity of terrorist event in terms of human causalities and infrastructure damage. Firearms including all such weapons which can be used from distance with projectile movement have β(Firearms)=0.0782 with significance at 5% increase PSX volatility. With use of firearms, terrorists are protected from horrific effect of terrorist attacks that logically increase the possibility of future attacks. This has a psychological effect on investors.

There are weapons with numerous surprising features that are unique, unknown to common public falling in others category has β(Others)=0.1998 with significance at 1% that increase PSX volatility. The surprise factors of such weapons translated by investors increase market volatility. It directs all the policy makers towards a new variety of weapons not considered before when policing for terrorism and counter terrorism

Table 6. (EGARCH Analysis)

Variables	Coefficient	Prob.			
ω	-1.072172***	0.0000			
α	0.325427***	0.0000		Section "A"	
γ	-0.088534***	0.0000			
∂	0.904284***	0.0000	Akaike info criterion	-6.158661	
WMBC	0.057688***	0.0089	Schwarz criterion	-6.141958	
SMC	0.169281***	0.0000	Hannan-Quinn criter.	-6.152753	
WMSC	0.068343***	0.0000			
Democracy	-0.093402***	0.0000			
F. Exchange	2.106656	0.3210			
ω	-1.046407***	0.0000			
α	0.318830***	0.0000		Section "B"	
γ	-0.087231***	0.0000	Akaike info criterion	-6.000110	
∂	0.906631***	0.0000	Schwarz criterion	-5.981889	
Explosives	0.053941**	0.0198	Hannan-Quinn criter.	-5.993665	
Firearms	0.078185**	0.0297			
Incendiary	0.016777	0.9197			
Other	0.199767**	0.0169			
Democracy	-0.086151***	0.0000			
F. Exchange	0.055990	0.4295			
ω	-1.091936***	0.0000			
α	0.325067***	0.0000		Section "C"	
γ	-0.088907***	0.0000			
∂	0.902047***	0.0000	Akaike info criterion	-5.997442	
Business	0.095694***	0.0040	Schwarz	-	

			criterion	5.976184
Educational Institution	0.144340***	0.0011	**Hannan-Quinn criter.**	-5.989923
Government	0.183371***	0.0001		
Private Citizen Property	0.070578**	0.0291		
Religious Group	0.149405**	0.0110		
Security Forces	0.078602*	0.0599		
Transportation	-0.076397	0.4586		
Others	-0.073228	0.1099		
Democracy	-0.094471***	0.0000		
F. Exchange	1.425405	0.5059		

Target of Attack

Who are the targets? A question arises after every terrorist attack. Table 6 (Section C) shows the effect of target of attack on PSX volatility. Religious group has β(Religious group)=0.1494 with significance at 5% increases PSX volatility. Muslims attach strong sentiments with religious places and figures. When any of them are targeted, strong reactions in the form of strikes and boycott are shown. This creates hurdle in the working of the stock market that increases the volatility. Targeting educational institutions (along with their students, teachers, and staff) has β=0.1443 with significance at 1% and private public property has β=0.0706 with significance at 5% increases PSX volatility. When terrorist shift their target from high value targets to low value easy approachable targets, because of strong counter terrorism measures by the government, it is termed as substitution effect (Enders & Sandler, 1996). Targeting common public locations shows substitution effect which depicts loophole in anti-terrorism policy by security agencies (Brück & Wickström, 2004).

Government has β=0.1834 with significance at 1% and security forces have β=0.0786 with significance at 10% increases PSX volatility. When they are targeted, it depicts weakness in security policy

Table 7. (EGARCH Analysis)

Variables	Coefficient	Prob.		
ω	-1.097653***	0.0000		
a	0.328006***	0.0000	Akaike info criterion	-6.000214
γ	-0.090358***	0.0000	Schwarz criterion	-5.983512
∂	0.901519***	0.0000	Hannan-Quinn criter.	-5.994306
Day Before Attack	-0.088764	0.1844		
Event Day	0.151476*	0.0871		
Day After Attack	-0.120432*	0.0656		
Democracy	-0.084225***	0.0000		
F. Exchange	0.455713	0.8215		

formulation by government officials, poor intelligence to counter insurgency and incapability of security forces. It is assumed that security providers are not capable enough to protect themselves, then in near future terrorism is further intensified which increases volatility. That is why huge budget is allocated to security forces by affected countries (Nasir & Shahbaz, 2015). Businesses has β=0.0956 with significance at 1%. It results in decreasing production, distribution because of injuries and killings of employees. It also hurts investor's confidence which results in decrease in foreign direct as well as foreign portfolio investment and employment (Eldor & Melnick, 2004).

Event Day

$$\log(h_t^2) = \omega + a |z_{t-i}| - E(|z_{t-i}|)) + \gamma z_{t-i} + \partial \ln(h_{t-1}^2)$$
$$+ \beta Democratic\ System_t + \pi Forex\ Volatilities_t +$$
$$\sum_{i=-1}^{1} \tau_i\ D_{i,t} \tag{6}$$

Equation 6 is used to estimate the impact of terrorist event on PSX volatility by constructing pre-event, event day and post event dummies.

Where Di=1 if the date is i day from event. Aslam and Kang (2013) verified the short lived effect of terrorist event, so one day pre-post event window is considered (i = -1, 0, 1). Table 7 shows terrorist attack increases the PSX volatility on event day with β=0.1514 with significance at 10%. Results confirm that terrorism induces volatility significantly existing on one day after terrorist attack but markets develop mechanisms to reduce the volatility (Aslam, 2014). That is why the day after attack has β= -0.1204 with significance at 10% reduces PSX volatility. Aslam (2014) claims that information about possible attack circulated by law enforcement agencies should increase volatility on pre event day. This study finds no such evidence to consider this claim true, because law enforcement agencies are not openly dispersing such information.

Conclusion

PSX is the most liquid market in Pakistan. Its volatility is massively affected because of political instability and terrorist activities. However, FX return fluctuations do not affect the PSX volatility because people hold international portfolios for risk diversification. Terrorism is negatively affecting the PSX's volatility in each possible way considered in this study. The market does not provide any information about possible future attacks. Foreign terrorism increases the volatility of PSX because trade and portfolio establish inter-linkages between the markets, which results in the negative spillover effects due to terrorist events take place in major trading partner's country (Ramiah & Graham, 2013). Domestic terrorist attack takes place in any city (except tribal areas and Gilgit) using explosives, firearms and unique arms and ammunition in the form of armed assault, bombing and suicide attacks while targeting business organizations, government, educational institutions, security forces and religious institutions increase the volatility of the domestic market on event day but market recovers back on next day due to inbuilt resilience. Investor and the common public consider a democratic form of government more

credible than military regime rejecting claims of Rodrik (2000), and Quinn and Woolley (2001).

All important aspects of terrorism along with FX return fluctuations and democratic government system are considered in this study. The non-availability of major macroeconomic data on daily basis limits us to consider it in this study. It is recommended that the government, law enforcement agencies, economists along with political representatives (ruling party, opposition party and trading partners' ruling parties) must group together while devising counter terrorism policies. It provides a way to resolve these issues in a fruitful way to boost the economic growth and development in Pakistan. This will bring back safe heaven for our future generations.

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