The Effect of Terrorism on Capital Market Returns: An Empirical Analysis of Emerging Market

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The empirical findings unfold the impact of terrorism collisions on the stock returns using 330 terrorist incidents took place in Pakistan from 2000 to 2017. The GARCH (1,1) methodology is employed to estimate the impact of terrorist incidents chosen based on the human loss. This study observes that the influence of terrorist attacks' changes with the days of the week, target type and surprise factor. The findings conclude that the terrorist attacks that target the security forces and commercial business places have a significant unfavorable impact on the stock returns. The significant impact of terrorist attacks on Monday and Tuesday confirm the overreaction of investors to terrorist transpires. Furthermore, the more surprise factor between the terrorist attacks exacerbates the adverse effect on market sentiments.
Keywords: Terrorist Attacks, Day of the Week Effect, Pakistan Stock Exchange.

INTRODUCTION

During recent decades, global terrorist threats have been rising exponentially. A lot of research has been done on the influence of financial markets due to terrorism incidents. Karolyi (2006) argues that terrorism is a geopolitical risk which influence the financial markets and global economic developments. Abadie and Gardeazabal (2003) empirically investigate that economic prosperity badly influenced due to terrorist activities. According to Abadie and Gardeazabal (2003), terrorism can produce several unfavorable effects on economic prosperity. For instance, after the 9/11 terrorist attack, the Dow Jones Industrial Average (DJIA) was declined by 14% in the intervening week (Lenain, Bonturi, and Koen, 2002). In literature, numerous studies already impinge the impact of terrorist attacks on fluctuation in financial markets (Karolyi and Martell, 2010; Arin, Ciferri and Spagnolo, 2008; Eldor and Melnick, 2004). The price changes might reflect the changes in firms' investment policies and uncertain future cash flows due to asset losses and higher security costs caused by the terrorist attacks (Karolyi, 2006). Terrorism creates uncertainty, panic, and instability that leads to a change in the policies of firms, financial institutions, government, and regulatory authorities. In such a risky and uncertain environment, investors shift their search for safe havens and withdraw their investments. Furthermore, in order to buffer the financial markets from terrorist shocks, Johnston and Nedelescu (2006) posit that regulatory authorities should act as a cornerstone to bring effectiveness and adaptable to new circumstances.

This study predominantly distinctive from prior researchers by fourfold contributions to the literature. The main theme of this study is to examine the influence of destructive terrorist attacks on the share market returns concerning target type, day of the week effect and surprise factor of the terrorist events. First, we quantify the impact by dividing the target of terrorist events into five categories, namely as Private Property, Religious, Business, Security and Government. Second, we examine the influence of terrorist events pertaining to five working days of the week. Third, we estimate the impact of the surprise factor (number of days between two consecutive terrorist events) of the terrorist events. Finally, this study also considers three important macroeconomic variables of oil, gold and exchange rate to explain the changes in stock market returns.

The core insights of this study are as follows. The influence of terrorist events diversifies with changing target types, days of the week effect and surprise factor. Terrorist events that took place on Monday, Tuesday and Thursday are particularly damaging for the execution of Pakistan Stock Exchange, while terrorist attacks that target the security forces and business sectors have the significant adverse impact on market returns. An empirical investigation depicts that the terrorist events with a larger surprise factor have a larger negative impact on the stock returns. These findings can be useful for investors, banks, insurance companies, and government agencies, to formulate the effective policy guidelines to reduce the costs of terrorism and to improve the stability of financial markets.

Pakistan is an ideal case, to inspect the influence of terrorism on the financial markets due to two main reasons. First, Pakistan has been facing a massive surge in terrorist activities for the last two decades. On-going terrorism in Pakistan severely damages the social and economic structure of the country. Terrorist tactics including suicide bombings, target killings, and bomb blasts have become routine occurrences. An important aspect of the political history of Pakistan is the undetermined status of the Kashmir (borders between India and Pakistan) that caused many conflicts like in 1948, 1965, 1971 and 1999. Although it is considered a parliamentary democracy, Pakistan has been heavily influenced by the military, in domestic as well as foreign affairs. Currently, Pakistan is a disputed aligns with the US and a major recipient of International aid for anti-terrorism efforts. Second, the Pakistan Stock Exchange apparently has growth potential as it is the liquid exchange in the region with both local and foreign listings. The Business Week declared the KSE the "Best

Performing Stock Market of the World for the year 2002". Similarly, the Pakistan Stock Exchange performed very well in the year 2013-14 and KSE-100 Index touched 40,472 points. As of 31th December 2017, there were 559 listed firms with a market value of $80.24 billion.

LITERATURE REVIEW

The reaction of the stock market to security events like war, terrorism, nuclear accidents, military tensions, and political instability have attracted a growing attention in the recent literature (Kawashima and Takeda, 2012; Kollias, Papadamou, and Stagiannis, 2010; Guidolin and La Ferrara, 2010; Athanassiou, Kollias, and Syriopoulos, 2006; Amihud and Wohl, 2004; Rigobon and Sack, 2005; Asteriou and Siriopoulos, 2000). In contradiction, several studies reported that financial markets can imbibe the effect of terrorist shocks and do not desensitize over time (Nikos et al., 2013; Peleg et al., 2011; Coleman, 2011; Chen and Siems, 2004; Drakos and Kutan, 2003). From a different perspective, Johnston and Nedelescu (2006) suggested that the immediately bendy response of the regulatory bodies is very important; in order to establish efficient market by absorbing the impact of terrorist attacks. One researcher, Karolyi (2006) documents the financial markets influenced due to terrorist attacks about factors which are already identified and those which have not yet identified. The findings conclude that there is less evidence regarding the economic and financial consequences of terrorism.

The magnitude of the influence of terrorist events diversifies with the size, development, and maturity of the stock markets (Kollias, Papadamou, and Stagiannis, 2011; Berrebi and Klor, 2010; Nikkinen et al., 2008). A number of studies focused on the developed stock markets of the US, UK, Spain and Israel (Karolyi and Martell, 2010; Zussman and Zussman, 2006; Kollias, Papadamou and Stagiannis, 2011; Arin, Ciferri and Spagnolo, 2008; Chen and Siems, 2004; Eldor and Melnick, 2004; Coleman, 2011). The literature agreed on the varying impact of terrorist attacks on economic prosperity and developed financial markets. For instance, Karolyi and Martell (2010) examine the effect of the 75 terrorist attacks on the stock prices of targeted companies. The authors find a stock price reaction of -0.82%, which is equivalent to a loss of $401 million per firm in each attack. Furthermore, the impact is larger in wealthier and democratic countries. From a different perspective, Coleman (2011) examines the market efficiency of different stock markets against the nine major terrorist attacks by Al-Qaida. The author documents that capital markets are semi-strong efficient takes less than 90 minutes to identify any terrorist attack and investors did not trade profitably ahead of any attack. In a very thorough study, Johnston and Nedelescu (2006) analyze the effect of terrorist events occurring worldwide in the financial markets. The authors find that financial markets are liquid, sound and diversified to absorb the impact of terrorist attacks and remained functional. Due to terrorist occasions, there is little or no confirmation that security markets are desensitized. The author posited that opportune and adaptable reaction of the administrative experts is critical for financial markets in imbibing the influence of terrorist shocks.

Likewise, Chen and Siems (2004) employ an event study methodology to estimate the effect of fourteen terrorist attacks in global markets. Their findings reveal that the US financial markets are now more resilient and flexible to terrorist shocks than other stock exchanges of the globe. From a very broad perspective, Nikkinen et al., (2008) estimate the effect of the 9/11 attack on 53 stock markets. Similarly, the authors conclude that the negative influence of share returns is for a short duration with the increase in the stock market volatility due to the terrorism, though, share market recuperated from such shocks quickly.

Numerous studies have compared the financial influence of terrorist events on the share market of UK and Spain (Kollias, Papadamou, and Stagiannis, 2011; Buesa et al., 2011; Barros, Caporale and Gil-Alana, 2009; Abadie and Gardeazabal, 2003, 2008). The terrorist events significantly decreased the Basque stock market returns while volatility was positively correlated to such events (Barros et al., 2009). Likewise, Arin et al., (2008) conclude that terrorist attacks have adverse effects on both stock returns and volatility. Furthermore, the reaction to terrorist attacks varies across countries; where European share markets (UK and Spain) affected less than the emerging stock markets. In contrast, several studies found that financial markets are efficient and flexible to absorb the impacts of terrorism. Kollias et al., (2011) estimate the impact of two terrorist events, the bomb attacks in London and Madrid, on stock exchanges in Spain and the UK. Their findings reveal that the terrorist events have a significant negative impact on most of the industries in the Spanish stock market only while London stock exchange recovered from terrorist events in one day. From the economic point of view, Abadie and Gardeazabal (2003) examine the economic influence of terrorism in the Basque country and document that there is a 10% gap in per capita growth of Basque country as compared to the synthetic control region. Basque stocks showed positive performance compared to the non-Basque stocks in peace, while a negative relative performance found at the end of the cease-fire. In a similar study, Abadie and Gardeazabal (2008) investigate that net foreign direct investment reduces to about 5 percent of GDP after an increased in 1 standard deviation terrorist risk. Uncertainty is not only the factor which is influenced by terrorism but also decreases return on investment which is estimated by researchers.

Few studies, particularly, focus on the Tel Aviv stock exchange of Israel (Eldor et al., 2012; Peleg et al., 2011; Zussman and Zussman, 2006; Eldor and Melnick, 2004). Zussman and Zussman (2006) investigate the outcome of terrorism on the Tel Aviv 25 index data. They argue that terrorism has a momentous and unfavorable influence on the Israeli economy. Furthermore, they conclude that the assassination of high-ranked senior leaders has more impact on the stock market than the killing of low-ranked members of Palestinian terrorist groups. Similarly, Eldor and Melnick (2004) examine the influence of 639 terrorist shocks on Tel

Aviv stock exchange (TASE) and on Israel's foreign exchange. Their findings reveal that terrorist attacks negatively influence on foreign exchange market but no significant collusion on the stock exchange was observed. They also argue that the location of attack is irrelevant while suicide attacks have long-lasting influence on the performance of the capital market. The suicide attacks with more causalities have a significant and great unfavorable influence on the capital market (Eldor et al., 2012).

There are a lot of studies primarily consider the influence of terrorist shocks on the performance of the Asian stock market (Nguyen and Enomoto, 2009; Bautista, 2003). In a very comprehensive study, Kollias, Papadamou and Psarianos (2014) estimate the influence of three nuclear tests conducted by North Korea in nine stock markets in the region. They find a more prominent unfavorable impact on account of the second of the three tests, although the effect was not uniform across all the countries. Similarly, Gaibulloev and Sandler (2009) posit that GDP per capita diminish by about 1.5% each year with each additional terrorist attack per million persons. According to Nikos et al., (2013), terrorist events have a brief influence on the Istanbul stock market and market recovers very quickly. Among existing literature, this study builds on a previous study by Aslam and Kang (2013), who explore the influence on share returns of the Karachi stock market due to terrorist attacks. The authors conclude with unfavorable influence. The authors found on attack day (T=0) and ahead of an attacking day (T=-1) negative impact of terrorist events on the stock market of Pakistan. The events like the Gulf War, the fiscal crisis, a coup attempt, and the power crisis have a significant impact on the stock market volatility of the Philippines (Bautista 2003).

RESEARCH METHODOLOGY
Sample

This research begins with the complete universe of terrorist attacks took place in Pakistan during 2000 and 2017. Plenty of terrorist events took place during sample period but this study selected 330 relatively noteworthy terrorist events based on several casualties and injuries in the event. We collect the characteristics of terrorist events such as attack date, target type and the number of casualties and injuries from the Global Terrorism Database (GTD), established by the National Consortium for Study of Terrorism and Responses to Terrorism (START) at the University of Maryland. The GTD information is predominantly more reliable when compared to other databases as GTD preserve comprehensive data for a study of terrorism in Pakistan as the GTD holds massive data in the form of 120 variables and considers attacks of all terrorist events as opposed to only transnational or international terrorist events. The daily closing values of KSE100 index, Pak rupees (PKR) exchange rates, gold and oil prices in terms of US dollars data is collected from the Pakistan Stock Exchange and Yahoo finance websites.

The impact is computed as of the day of the attack, or the next trading day. This study deems the timing of each terrorist attack as if any attack took place after the closing time (3:30 PM) of stock market then the attack's impact is computed on the next working day. The Pakistan stock market absorbs the shocks of terrorist attacks very quickly and recovers in one day (Aslam and kang, 2013). Considering these findings, terrorist attacks on weekends are ignored. We consider the data that is more certain and exclude terrorist events with zero or an unknown number of death and injuries. The KSE-100 index is a free-floated market capitalization index which is not adjusted for dividends and risk-free interest rate. The ignorance of dividends and interest rates do not cause any significant errors in the model (Nelson, 1991). Table 1 reports the summary of 330 relatively noteworthy attacks that took place in Pakistan during 2000 and 2017.

Table 1: The classifications of terrorist attacks

Day of the Week	No. of Incidents	Target Type	No. of Incidents
Monday	72	Private Property	93
Tuesday	43	Religious	42
Wednesday	60	Business	76
Thursday	72	Security	69
Friday	83	Government	50
Total	330	Total	330

Methodology

The estimation of the association concerning terrorist events and share market proceeds is undertaken by using the GARCH (1,1) with an event dummy variable. The GARCH (Generalized ARCH) model was proposed by Bollerslev (1986) and Taylor (1986). This model permits the restrictive variance terms to be reliant on both past values of lagged squared residual terms and the past values of variance itself. This paper includes the exchange rate returns of PKR in terms of U.S. dollars as a control variable.

This study employs the model that having the minimum values of Akaike information criterion (AIC) and Schwarz information criterion (SC) is considered the best model to be chosen. For detailed analysis, following three groups of dummy variables are defined to explain the stock market reaction with respect to the (i) target type, (ii) days of the week, and (iii) surprise effect of the terrorist events. The extant literature incorporates the dummy variables in GARCH family models to estimate the impact on time series (Choi and Kim, 1991; Nguyen and Enomoto, 2009; Nikkinen and Vahamaa, 2010; Kollias, Papadamou, and Stagiannis, 2011).

Target Type Effect

The terrorist attacks are divided into five most common target types, namely as Private Property, Religious, Business, Security, and Government. This study identified the following five dichotomous dummy variables for each category type: $TGT_i = 1$ if Target type is i; 0 otherwise. i = Private Property, Religious, Business, Security, and Government. The dependent variable is the KSE100 index returns and the independent variables are PKR exchange rates, crude oil prices, gold price daily returns and five dichotomous target type dummy variables. The GARCH (1,1) model is used to estimate the impact of terrorist target type on the stock market returns as follows:

$R_{KSE,t}=\beta_0+\beta_1 R_{Oil}+\beta_2 R_{Gold}+\beta_3 R_{ER}+\sum_{K=1}^{5}\beta_{3+K}TGT_i+\mu_i$ .... Eq(1)

$\mu_t\Omega_t=iidN(0,\sigma_t^2)$ .... Eq(2)

$\sigma_t^2=\Upsilon_0+\sum_{j=1}^{p}\delta_i\sigma_{t-1}^2+\sum_{j=1}^{q}\alpha_0\mu_{t-1}^2$ .... Eq(3)

Where R_{Oil}, $R_{Gold,}$ and R_{ER} represent the daily returns of oil, gold and exchange rate in equation (1). Equation (2) shows that the error term is normally distributed with mean zero and variance σ_t^2, while equation (3) shows that the conditional variance is derived from the past behavior of the variance itself and square of past error terms $(\mu_t^2$-$j)$. $R_{KSE,t}$ is the daily market returns of KSE100 index for period t and KSE_t is the closing value of the KSE100 index at time t. The benchmark index is adjusted neither for corporate restructuring, stock dividends, cash dividends, and risk-free rates. This study overlooks the payouts and risk-free rates as it doesn't make any significant error when valuing stock market volatility (Nelson, 1991). The logarithm of daily percentage index returns is computed using the equation (4):

$R_{KSE,t}=ln(KSE_t)-ln(KSE_{t-1})$ .... Eq(4)

Day of the Week Effect

Preliminary analysis of the data reveals that there are temporal and spatial patterns in the days of the week, target types and attack types in Pakistan. This study identified the following five dichotomous dummy variables (i.e. for Monday to Friday) to compute the impact of terrorist events on different days of the week: $DAYi$=1 if the day of a terrorist event is i, and 0 otherwise (i = Monday, Tuesday, Wednesday, Thursday and Friday). The benchmark index returns is used as a dependent variable while five dichotomous dummy variables and few control variables are used as independent variables.

The GARCH (1,1) model is used to examine the influence of terrorist events on KSE100 returns with respect to five days of the week dummies is described as follows:

$R_{KSE,t}=\beta_0+\beta_1 R_{Oil}+\beta_2 R_{Gold}+\beta_3 R_{ER}+\sum_{K=1}^{5}\beta_{3+K}DAY_i+\mu_i$ .... Eq(5)

Surprise Effect

Finally, the simple regression methodology is used to examine the terrorist event surprise factor. The daily return of KSE100 index is used as a dependent variable while surprise factor (number of days) the difference between two terrorist attacks is used as an independent variable. The association between KSE100 index returns and the surprise factor is postulated in equation (6).

$R_{KSE,t}=\alpha_0+\beta_1(Surprise\_Factor)+\mu_i$ .... Eq(6)

RESULTS AND DISCUSSION

Table 2 depicts the measures of central tendency, shape, and dispersion of the KSE100 index, gold, oil, and exchange rates. The KSE100 index data have a daily on average returns of 0.08% with a standard deviation of 1.39%. The mean of daily market returns is completely dominated by the standard deviation of returns indicating that the market returns often deviate from the mean. In addition, the possibility of rejecting a zero mean return is not possible. The coefficient of skewness is -0.2682 suggesting that the series have a long-left tail. Hence, the returns distribution is asymmetric or negatively skewed. Based on Jarque-Bera test, the null hypothesis for the normal distribution is rejected at .01 level.

Table 2: Descriptive Statistics

Variable	R_{KSE}	R_{GOLD}	R_{OIL}	R_{ER}
Mean	0.0008	0.0004	0.0003	0.0002
Median	0.0013	0.0000	0.0008	0.0000
Maximum	0.0851	0.0820	0.1717	0.0953
Minimum	-0.0774	-0.0960	-0.3134	-0.0264
Std. Dev.	0.0139	0.0117	0.0264	0.0029
Skewness	-0.2682	-0.2893	-1.2292	10.0824
Kurtosis	6.3697	9.0402	18.0691	324.0585
Jarque-Bera	1887.51	5969.30	37794.76	16777536.00
Probability	0.0000	0.0000	0.0000	0.0000
Obs.	3890	3890	3890	3890

This study conducts the Augmented Dickey-Fuller (ADF) test to examine the stationary of KSE100 index return series. The series is tested against three models (i.e. None, Intercept, Trend and intercept).

Table 3: The results of Unit Root Test

Models	ADF Stat	N
$\Delta Rt=\delta Rt-1+\mu_t$	-56.35052***	3890
$\Delta Rt=\alpha+\delta Rt-1+\mu_t$	-56.5124***	3890
$\Delta Rt=\alpha+\beta T+\delta Rt-1+\mu_t$	-56.5093***	3890

Based on Schwartz information criteria (SIC), the null hypotheses of unit root tests are rejected in all models. We can argue that the market returns series is stationary at level and we can proceed to model the conditional volatility with ARCH/GARCH-class models.

Furthermore, to determine the presence of conditional heteroskedasticity or autocorrelation in the KSE100 index series, we compute the 'ARCH-effects'. The ARCH test is like the Lagrange multiplier (LM) test for autoregressive conditional heteroskedasticity (ARCH) in the residuals (Engle 1982). This test is like the Lagrange Multiplier (LM) test for autocorrelation. We run the following linear regression to get the residuals û.

$R_{KSE,t}=\alpha_0+\beta_1 R_{KSE,t-1}+\mu_i$ .... Eq(7)

After obtaining the squared residuals, we regress them on q own lags to test the ARCH of order p, as indicated in equation (8). The LM test statistic is equivalent to Obs*R-square test statistic, where Obs is the sample size and R-square estimated through auxiliary regression.

$\mu_t^2=\alpha_0+\alpha_1\mu_{t-1}^2+\alpha_2\mu_{t-2}^2+\ldots+\alpha_p\mu_{t-p}^2+\upsilon_t$ .... Eq(8)

Table 4 shows the results of the ARCH(1) test of the KSE100 index by using the OLS method. The value of Obs*R-squared is 501.4858 and statistically significant at .01 level that confirm the presence of ARCH effect in the series. These results clearly identify the volatility clustering in the residual series and reject the null hypothesis of homoskedasticity. We, therefore, conclude that the conditional volatility with ARCH/GARCH family models would be better than OLS.

Table 4: The findings of Testing ARCH effect

Heteroskedasticity Test: ARCH

F-statistic	575.41	Prob. F(1,3888)	0.0000
Obs*R-sq.	501.49	Prob. Chi-Sq.(1)	0.0000

Target Type Analysis

This section estimates the impact of terrorist events on KSE100 index with respect to five target types. Table 5

presents the estimations computed from OLS/Newey-West and GARCH models, in which KSE100 index returns is the dependent variable and the independent variables are gold, oil, exchange rate and five target types' dummy variables.

Table 5: The findings of Target Type Analysis

Variable	Coefficient	Std. Error
Mean Equation		
Constant	0.0014***	0.0002
Gold	-0.0119	0.0110
Oil	0.0191***	0.0053
Exchange Rate	-0.1229	0.0769
Business	-0.0208***	0.0015
Security Forces	-0.0075***	0.0017
Private Property	0.0005	0.0021
Religious	-0.0021	0.0017
Government	0.0031	0.0034
Variance Equation		
Constant	0.0000***	0.0000
RESID(-1)^2	0.1720***	0.0111
GARCH(-1)	0.7820***	0.0111
No. of Observations	3,890	

*, **, *** denotes Significance at 90%, 95% & 99% confidence level respectively

The findings of the mean equation show that a 10% increase in international gasoline prices creates a positive impact of 1.91% in the KSE100 index returns on the event day, ceteris paribus. We report that terrorist attacks targeting business sector and security forces (i.e. armed forces, intelligence agencies, and police) are particularly destructive for the Pakistani stock market. The coefficient for Business (*BUSINESS*=-0.0208) indicates that there is a 2.08% daily drop in KSE100 index returns after the terrorist attack on the business sector is announced. Similarly, a terrorist attack on security forces (*SECURITY*=-0.0075) generates a downward movement of .75% in KSE100 index returns, statistically significant at the .01 level. However, terrorist events on other targets have a non-significant impact on KSE100 index. In the variance equation, both the ARCH and GARCH terms having a significant coefficient indicates that there is an explanatory power of existing volatility from the prior periods. With the addition of ARCH and GARCH coefficients such as (0.1720+0.7820= 0.9540) is very close to unity, implying that the GARCH model is stationary, though the volatility shocks are quite persistent.

Based on our empirical findings, we can easily say that terrorist events targeting the security agencies and corporate institutions are particularly devastating for the performance of the capital market; but other target types do not have such impact. One of the major goals of terrorism is to create uncertainty, disruption, and vulnerability in the business environment. The vulnerable environment reduces the confidence of investors, leading to a decline in investment and economic growth. Karolyi (2006) argue that the price changes might reflect the changes in firms' investment strategies and future cash flows due to higher security costs and direct asset losses caused by terrorist attacks. Larobina and Pate (2009) find that terrorism has a detrimental impact on corporate society, tourism, aviation, and equity market. Terrorist attacks targeting the business sectors kill the key employees, interrupt supply, disturbs the communication and increase the business cost. Jain and Grosse (2009) argue that terrorism leads to a decline in FDI, International trade and slows down the business process. The terrorist events increase attention to security concerns, transportation cost and the business risk in foreign countries.

Day of the Week Effect Analysis
This section estimates the impact of terrorist events on KSE100 index with respect to five days of the week. Table 6 presents the findings of GARCH (1,1) models estimated through OLS/Newey-West.

Table 6: The findings of Day of the Week Analysis

Variable	Coefficient	Std. Error
Mean Equation		
Constant	0.0014***	0.0002
Gold	-0.0072	0.0118
Oil	0.0093	0.0058
Exchange Rate	-0.1481**	0.0696
Monday	-0.0037***	0.0011
Tuesday	-0.0088***	0.0014
Wednesday	0.0028	0.0074
Thursday	0.0007	0.0018
Friday	0.0008	0.0024
Variance Equation		
Constant	0.0000***	0.0000
RESID(-1)^2	0.1782***	0.0114
GARCH(-1)	0.7768***	0.0111
No. of observations	3,890	

*, **, *** denotes Significance at 90%, 95% & 99% confidence level respectively

Results depict that 10% appreciation in the US dollar decreases the KSE100 index returns by 1.034% on the event day, ceteris paribus. Terrorist events on Monday and Tuesday are predominantly shocking to share market based on our empirical findings. The coefficient for Monday dummy variable (*MONDAY*=-0.0037) indicates that there is a .37% daily drop in KSE100 index returns if the attack day is Monday, significant at .01 level. Likewise, the terrorist attacks on Tuesday (*TUESDAY*=-.0088) generate downward daily movement of .88 % in the KSE100 index. However, Terrorist attacks on other days of the week have insignificant effect on the stock market performance. The finding shows that the sum of the ARCH and GARCH coefficients (0.1782+0.7768 =

0.9550) is very close to one, indicating that volatility shocks are quite persistent.

Our results show that terrorist attacks take place on Monday and Tuesday has a significant adverse impact on the KSE100 index. Our results are consistent with the studies of Hussain et al., (2011) and Veronesi (1999). Hussain et al., (2011) evaluate the days of the week anomalies in Pakistan and conclude that the market returns are consistent with a weak form of efficiency and Tuesday effect in the stock market. The average daily returns of Tuesday are significantly positive as compared to the returns of other days. Tuesday is a good day as compared to other days of the week. The overreaction and under reaction of the stock market is subject to bad or good news. Veronesi (1999) conclude that the investors do not react to new information in the same way as bad news are overreacted in good times and good news are under reacted in bad times.

Surprise Effect Analysis

This section estimates the impact of the surprise factor (number of days between two consecutive attacks) on KSE100 index from 2000 to 2017. The findings of the surprise factor regression model are reported in Table 7.

The results of Durbin-Watson statistics (DW=1.80) and Breusch–Pagan test (F-statistic=1.17) confirm that the regression model is not plowed to the issues of autocorrelation and heteroskedasticity. Our empirical findings show that an increase in the number of days between terrorist events has a larger unfavorable influence on stock market returns. The OLS coefficient of surprise factor (β=-0.0004) indicates that, on average, an increase in one day between the terrorist events is associated with an effect of -0.04 percent, statistically significant at the .01 level.

Table 7: The findings of Surprise Effect Analysis during 2000-2017

Variable	Coefficients	Std. Error
Intercept	0.0023***	0.0009
Surprise Factor	-0.0004***	0.0001
Durbin-Watson test:		
DW	1.8030	
Breusch–Pagan test:		
F-statistic	1.1748	
No. of observations	330	

*, **, *** denotes Significance at 90%, 95% & 99% confidence level respectively

The findings conclude that terrorist events with a larger surprise factor have a larger negative effect on KSE100 index returns. Taleb (2007) explains the existence and occurrence of unpredictable, infrequent and high-impact events that are beyond the realm of normal expectations. According to the author, the events with a larger gap are improbable and people develop a psychological bias and 'collective blindness' to them, which makes them more dangerous. Griffin and Tversky (1992) find that psychological biases are stronger in case of uncertainty. Following the infrequent terrorist attacks, it is quite likely that the uncertainty in the stock market increased substantially. The investors seem to panic in response to unexpected, shocking news and overreact that magnifies the impact of unpredictable terrorist attacks. On the other hand, frequent terrorist events with a low gap may seem a routine happening and might be responsible for the cold-blooded attitude of investors (Gul et al., 2010). The investors might also learn from the first event and had correctly valued the subsequent attacks. The nonreactive attitude of the investor is a quite natural phenomenon on high-frequency events. Many frequent terrorist events seem that it has the potential to desensitize investors, resulting in immunity to the adversity of fearful events. The repeated exposure of terrorist events results in diminishing emotional responsiveness from investors. The enormous number of events should have created enough tolerance for economic agents in Pakistan.

CONCLUSION

Terrorism has become the biggest threat to Pakistan's progress. Terrorist events not only damage the national security of the country but also the economy, financial markets and social fabric of the country. In total 330 comparatively major terrorist events on the share market of Pakistan has been investigated. Events occurred due to terrorism have varying influences on the performance of the Pakistani capital market based on our empirical findings. The impact of terrorist events varies relating to the days of the week, target type and surprise factor of the events. All other things being equal, terrorist attacks that took place on Monday and Tuesday are particularly destructive to the performance of the Pakistan stock market. In target types, attacks on security forces and business sectors, particularly exert a negative influence on market returns. More interestingly, terrorist events with large surprise factor have a larger negative effect on stock market returns, ceteris paribus.

However, these shortcomings, this study can produce managerial implications in varied areas of portfolio and risk management with diversification, policy recommendation, and stock trading. Considered the influence of terrorist events regarding the days of the week, the target of the terrorists and surprise factor between the events, investors could manage their investment holding period. Several foreign investors, retail investors and a lot of management companies who invest their funds in index funds or equities with the aims to replicate the movements of KSE100 index. Furthermore, for such management companies, the quantitative terrorism risk estimation might be productive to handle their risk and investment decisions. This quantitative assessment might also be helpful for foreign investors to update their portfolio diversification strategies. The attacks targeting the business sector essentially devastate for the stock market. The business community must manage their own security, in addition to the security provided by the state. To minimize the influence of terrorist events, the Pakistan stock market, media and other relevant authorizes should increase the quantity, quality, and credibility of the information. The authorities should take extra precautionary steps to protect business sector and security forces to minimize the impacts of such shocks. Finally, the most important is that anti-terrorism policymakers and financial

regulatory authorities should cooperate, communicate and design strategies to provide a timely, rapid and effective response to such terrorist events. In numerous ways, this study could be extended. First, scholars can expand the sample countries to better analyze the influence of terrorist events across the financial markets of the Asian region. Secondly, to consider the industry and firm level analysis, to find out how different sectors or firms react to terrorist shocks.

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