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RESEARCH PAPER

Bidirectional Relationship between Terrorism and Pakistan Stock Market: Evidence from ARDL and Nonlinear ARDL Approaches

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ABSTRACT

This study used to find the effect of terrorism attacks over the Overall Pakistan Stock market for the period from January-2005 to December 2019. This study used all the companies registered in the Pakistan stock exchange. By employing ARDL technique this study statistically proved the existence of long-run relationship between the variable as there is co-integration between them. Diagnostic tests are also found to be satisfactory. Goodness of Fit R^2 of the model is 12.6% which is due to the impact of other variables on the stock return. NARDL is also applied and the results indicated that stock market reacts to terrorism activities in the short term due to increases and decreases in terrorism activities. However, no long run asymmetry is observed. This study couldn't include international stock markets due to time and financial constraints. Future research can included other countries' data and compare the results with this study.

Introduction

Stock market of a country plays a very critical role in the cash flow of a country and its economic development since it provides opportunity for investment to investors. According to Lee (1998), stock exchange of a country provides an opportunity to government for implementation of privatization plans. Stock market is a part of financial market that also include bond market and other financial instruments. The financial market urges sense of saving and investment among the individuals in contradiction to spending, which help individuals to earn return from their investment. The return on stock can be calculated using fundamental or technical analysis. The return is affected by a number of factors that include investors sentiments and other macro-economic conditions.

In the past years, we have experienced an increase in the number of terror events worldwide, which have had a direct and an indirect financial consequence. The direct cost is referred to human losses, while indirect cost is related to the effects of terrorism on consumer behavior and investor confidence. Consequently, it can be reflected on the stock market and in the economy of that specific country. Nowadays, due to globalization, financial markets and economies around the world are much more interlinked than in the past. Financial institutions can be involved in financial crimes as victims or as instrumentality. They can be subject to different types of fraud or abuse, but similarity, terrorism can have several implications for financial markets making them, directly or indirectly, the victim of it. In the recent years, terrorist attacks have shown a new trend, moving from military targets to civilian ones, including individuals and business activities. The increase of such attacks has raised the international awareness of the danger of terrorism and its repercussions on the financial markets. Whether it occurs in one part of the world or in the other, terrorism has become a phenomenon that influences the performance of stock markets all over the world.

Pakistan faced a lot of domestic as well as international challenges in terms of security since independence in 1947. Pakistan faced wars with India and separation of east Pakistan from its territory. The major security problems faced by Pakistan was due to its involvement in alleged Afghan Jihad in 1980 (Hartman, 2002). Furthermore, these security issues worsened after the attack of 9/11 on twin towers of USA and consequently usage of ports by America for Nato supply and initiation of "War on Terrorism" and other security related operations against terrorism in Pakistan (Nawaz & Borchgrave, 2009).

Since the involvement in "war on terrorism" Pakistan has been facing terrorism everywhere, in masjids, schools, parks, political and other private gatherings. According to a study, from 2003 to 2017 Pakistan has lost almost 62000 lives on wars against terrorism (SATP, 2017). After the start of Operation Zarb-e-Azb and operation Rad-dul-Fasad, terrorism event has started to diminish but still threat of terrorism is a major challenge to the economy of Pakistan. Pasha, 2010 argued that due to dominance of military, Pakistan's civil society has very weak interference in policy making process.

Pakistan is a model 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. A significant phase 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 acknowledged the KSE as "Best Performing Stock Market throughout the whole world during 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

Terrorism is not a recent phenomenon, rather it was primarily examined using stochastic model for social contagion in a formal way by Hamilton and Hamilton (1983). The result of their study concluded that terrorist attacks begin to ignite other attacks when society takes longer time to respond towards a terrorist attack. The importance of this study belongs to the methodology that the authors introduced in the literature for the first time about the terrorism. This study also provided new contagion model which have properties of mathematical as well as practical advantages over the previously used models. In particular, the findings have provided an indication of the shortcomings of the earlier methodologies developed. Such shortcomings derived from an important feature of the terrorism not taken into account: the point that most of the terrorist activities eventually decline and reverse back. The empirical results should be considered as preliminary indication, which imply that a reversal of terrorism is stronger in repressive environment. However, this finding is not in line with the findings found in different studies conducted in emerging countries. For example, Pakistan is considered a country in which is not totally open yet. By analyzing the stock market performance during the terrorist attacks in such country, there is no finding of reversal of terrorism. However, Hamilton and Hamilton have conducted this study in the 1983, where the markets were not fully integrated to one and another as they are today and some emerging countries did not have an own stock market yet. Going back to the paper, it also presents other number of limitations in the data taken into account. The authors confined their study within country's contagion so that an inclusion of other country's contagion effects and other dynamics would be an important improvement. Moreover, they have used the best data sets available back to that time; however, this can be overcome by using better statistics on all factors such as terrorist events and country specific characteristics. Despite those main limitations, the findings emphasize the warnings that governments and citizens of open societies have to respond very carefully to terrorism to avoid cures that are ineffective. However, in terms of the conclusion, the findings should not only associate to open societies, but around the globe as it shown in studies conducted in Pakistan, Israel, that even in the repressive environment there is no reversal of terrorism. Even the

emerging countries, as in this case Bangladesh, government and citizens should respond carefully to terrorism.

Aslam and Kang (2013) studied the terrorism effects on stock market of Pakistan. They used a daily time series data for the year from 2000 to 2011. They used an event study approach; and concluded that occurrences of terrorism had negative effect on the stock market. They showed a adverse impact on the KSE-100 index of Pakistan, which certainly means that not only the human lives matter but the economy and stock market also react negatively over such negative events. From their results, it can be derived a negative relationship between terrorist attacks and the performance of the stock markets This is in line, with all the studies conducted about the relationship between terrorism and stock market performance. Interestingly, they have found that predictions and rumors and also affect stock market negatively. Moreover, they have considered different locations and different types of terrorist attacks. They found that the impact of attack depends on the location and on the type. Similarly, they argued that the effect is short-lived: the market recovers from terrorist shock quite soon, mainly in one or two days. This confirms the same results from Chen and Siems's (2004) research, where they proved that the terrorist attacks have only a transitory impact on the stock markets. This is because empirical findings indicate that over time the financial markets have become more resistant than ever, and that the recovery phase from the damage of the terrorist attacks is faster.

Terrorism has been Pakistan's most serious issue since its participation in the "War on Terror." There were 3,601 terrorist acts of various kinds between 9/11 and December 2011. (GTD, 2013). These assaults have directly harmed the country's economy by reducing foreign direct investment (FDI), jeopardizing local investor trust, and unsettling financial markets, resulting in weaker economic growth, more unemployment, and more poverty (Shahbaz, 2013).

Alam (2013) used the 'Terrorism Effect Factor,' which was created to examine the whole effect of terrorist activities rather than investigating the particular terrorist events, to investigate the connection amongst terrorist actions in Pakistan and fluctuations in financial market. Their result indicated that in short term, there was no substantial connection between terrorism attacks and returns on stock market; nevertheless, terrorism had a detrimental effect on stock returns in the long term.

Keitany and Barasa (2012) stated any unanticipated event of socio-political nature can influence the stock market positively or negatively. Which will increase the volatility by having a negative or positive impact on the price of stocks and change in the investor's decision making. Given stock market liquidity, terrorism can have an immediate effect on the prices of stocks. However, this is not the case only where markets are liquid, but also in such countries as Pakistan, Bangladesh or Israel

that are considered emerging countries and the markets are not fully liquid as the rest of the world. In fact, terrorist attack by being an unexpected phenomenon affects all societies around the world, having a negative impact on the prices of the stocks. It is true that the more developed is the country, the larger would be the impact, but due to globalization the effects are spilled over around the world. The main findings arise from this study is that terrorism has a negatively impact on the transactions processing in the market. Additionally, it puts constraints on the buying and selling activities such that it instills fears in the air as well as destroys infrastructural facilities. As it was for Chesney et al. paper in 2011, the authors underline the concept of the ability of the investors to diversify their portfolios against the terrorism risk. This would be possible by maximizing their returns while minimizing the losses related to terrorism. As in many studies, there are certain sectors of the economy, such as tourism, airline companies are more sensible to the terrorist attacks respect to other sectors. Moreover, there is a common characteristic between such a paper and the one from Eckstein and Tsiddon in 2004. Such a similarity is devoted to the need of the government in investing more in security, such as intelligence gathering mechanism as well as security personnel to avoid terrorism. However, there are some limitations to the paper, in particular because it focuses on the terrorist attacks in Kenya, which back to that time, it was a recent phenomenon. This implies that there is no a readily available and adequate data. Additionally, other events may have affected the performance of the stock market exchange during the period selected such as inflation, elections and so on. Consequently, this would affect the results of their study as whole. One of the suggestion to improve such a study is the one to adopt, in addition to event-study methodology, the GARCH-EVT approach and other non-parametric methodology. Those methodologies can be found in Chesney et al. paper (2011), which emphasizes the importance and the accuracy of those methodologies in studying such terror events.

Essaddam and Karagianis (2014) conducted a study to gauge the impact of stock market volatility and terrorism. Terrorism has been recognized as a significant risk factor in explaining stock return volatility. Volatility rises on the day of the assault and stays substantial for at least 15 days thereafter, indicating a lasting impact, according to an event research method and bootstrapping method. The severity of this impact varies depending on the features of the nation where the event happened. It was also shown that companies operating in richer or more democratic nations experience higher stock market volatility than companies operating in underdeveloped nations.

There are many studies that focus on the impact of terrorist shocks on Asian stock market performance (Nguyen and Enomoto, 2009; Bautista, 2003). Kollias, Papadamou, and Psarianos (2014) assess the impact of three nuclear tests by North Korea on nine financial markets in the area in a thorough research. They discover a stronger negative impact as a result of the second of the three experiments, but the

effect was not consistent across all nations. Similarly, Gaibulloev and Sandler (2009) claim that each new terrorist strike per million people reduces GDP per capita by approximately 1.5 percent per year. Terrorist incidents have a short impact on the Istanbul stock market, according to Nikos et al., (2013), and the market soon recovers. This research expands on a previous study by Aslam and Kang (2015), which looked at the impact of terrorist attacks on the Karachi stock market's share returns. The authors conclude with a negative impact. The authors discovered a negative effect of terrorist events on the Pakistani stock market on attack day (T=0) and ahead of an attack day (T=-1). Events such as the Gulf War, the fiscal crisis, a coup attempt, and the power crisis have all had a major effect on the Philippines' stock market volatility (Bautista 2003).

Using event research methods, Ramiah and Graham (2013) investigated how the Indonesian stock market responded to terrorist incidents in the United States (9/11), London (7/7), Spain, India, and even Indonesia. The September 11 attacks and the Bali bombings had a negative impact on stock portfolios, according to the findings. Domestic terrorist acts also had a detrimental effect on the Indonesian stock market, while terrorist

Aslam and Kang (2013) examined the impact of 300 terrorist incidents on the stock market in Karachi, Pakistan, utilizing daily data from the Karachi Stock Exchange (KSE)-100 index and terrorist incident headlines from 2000 to 2012. The results show that terrorist attacks had substantial negative impacts on the KSE-100 index on the day of the attack and one day before the assault, but that this impact is only temporary. The effect of an assault varies depending on the location, kind, and intensity of the assault, according to empirical studies.

Hypotheses

H1: Terrorism has significant relationship with Pakistan Stock Exchange.

H2: There is a causal relationship between Terrorism and Pakistan Stock Exchange.

Material and Method

This Study intends to find the effect of terrorism on stock market return using linear as well as non-linear ARDL models. This study used stock return data of all the all the listed companies of Pakistan stock exchange. Sample period comprises of January 2005 to December 2019. Monthly data for overall stock market return was obtained from Pakistan Stock market website and terrorism related data was gathered from famous Global Terrorism data base.

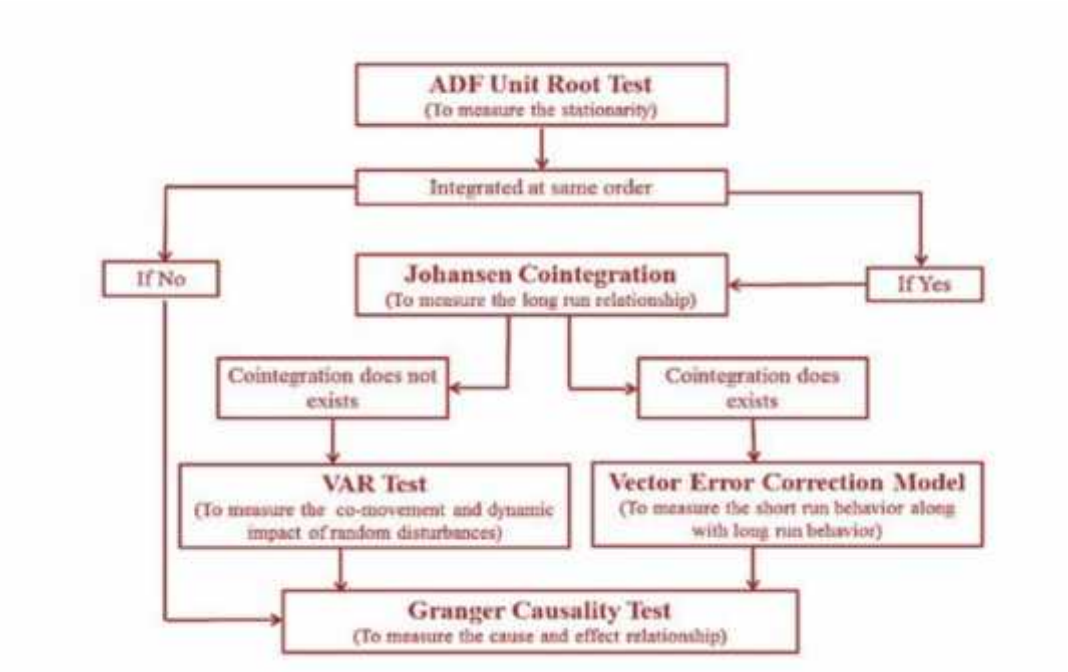


Figure 1: Flow Diagram of Research Methodology (after Attari et. al, 2014).

Sample Period and Variables Measurement

Sample period of study comprises from 2005-2019. The data used in this study is obtained from Global Terrorism Database, and from Pakistan stock exchange website.

Terrorism data is attained from the renowned source i.e., Global Terrorism Database (GTD, 2016) for the sample period mentioned and an index is created similar to GTD, 2015. The index covers all the terrorism events (whether small or large) occurred during the sample period. Using the GTD terrorism index, monthly index was developed. Following 4 factors will be taken into account for creation of monthly terrorism index:

1. Sum of terrorism events occurred in a specific month.
2. Sum of fatalities incurred in the terrorist attacks occurred in a specific month.
3. Sum of injuries incurred in the terrorist attacks occurred in a specific month.
4. Sum of damages occurred to assets in the terrorist attacks in a specific month.

Given weights were assigned to each specific factor for creation of terrorism index.

1) Terrorism events occurred. 1

2)	Fatalities	3
3)	Injuries	0.5

Following weights were assigned to the asset damaged according to their level of damages:

1)	Unknown	0
2)	Minor damages (likely < $1 million)	1
3)	Major damages (loss between $1 million to $1 billion)	2
4)	Catastrophic (loss > $1 billion)	3

Data of share price for each company was obtained from website of Pakistan Stock exchange. Which was then converted into monthly return on each stock and then we took averages of returns on each stock as overall market return for a given month. Following table shows the details of methods employed and their equations.

Table 1: Methods and Formula

Sr.N	Methods Employed	Model/Formula	Purpose
1	Unit Root Tests(ADF)	$\Delta Y_t = \delta Y_{t-1} + \sum_{i=1}^{n} \beta_i \Delta Y_{t-i} + u_t$ $\Delta Y_t = \alpha_0 + \delta Y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta Y_{t-i} + u_t$ $\Delta Y_t = \alpha_0 + a_1 t + \delta Y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta Y_{t-i} + u_t$	It is used to check whether the data selected for this study are stationary or non-stationary.
2	Unit Root Tests (Ng-Perron Test)	$\Delta \mathcal{Y}_t = \sum_{i=0}^{p} \alpha_i t^i + \delta \mathcal{Y}_{t-1} + \sum_{i=1}^{k} \beta_i \Delta \mathcal{Y}_{t-i} + u_t$	It is used to check whether the data selected for this study are stationary or non-stationary.
3	Johansen's Cointegration Test	Trace Test Statistic $\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} \ln(1 - \lambda_i)$ Maximum Eigenvalue Test Statistic $\lambda_{max}(r, r+1) = -T \ln(1 - \lambda_{r+1})$	It is applied to test the presence of long-run equilibrium relationship between the selected time series data.
4	Granger Causality Test	$y_t = \alpha_0 + \sum_{i=1}^{m} \alpha_i y_{t-i} + \sum_{j=1}^{n} \beta_j x_{t-1} + \varepsilon_t$ $x_t = \omega_0 + \sum_{i=1}^{m} \gamma_i y_{t-i} + \sum_{j=1}^{n} \theta_j x_{t-1} + \varepsilon_t$	It is applied to find the direction of causality and short-run relationship between selected time series data.

(Luqman et al. 2018, 2019, 2020)

Results and Discussion

Descriptive Analysis

Descriptive statistics includes data description including mean, median and mode. It also includes standard deviation, which indicates variation in the data. Standard deviation of terrorism index is high that shows the high variability between the index. Descriptive statistics provided in table 1,2 shows the descriptive of data.

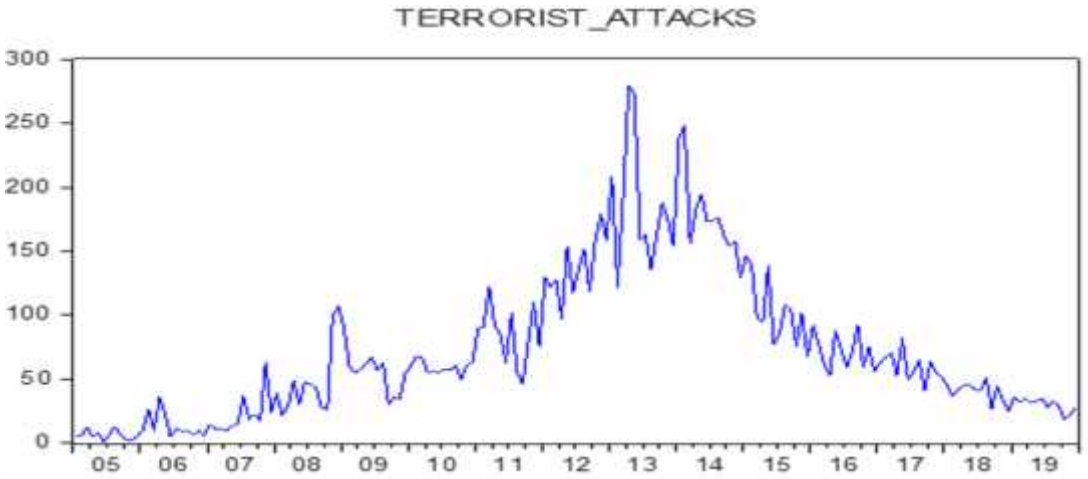
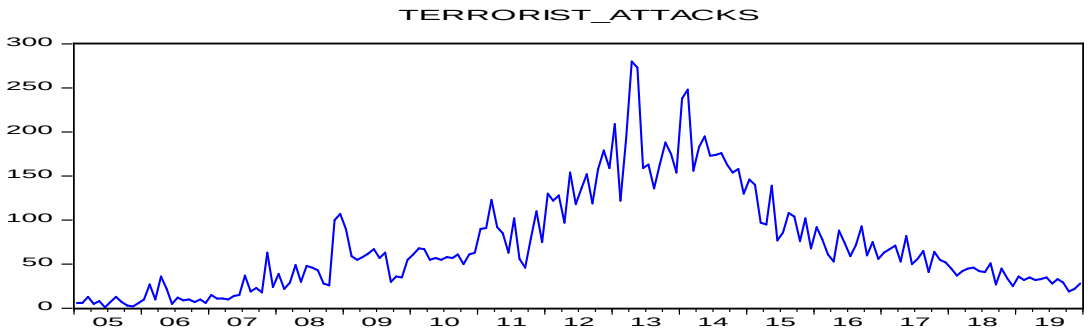


Table 1
Descriptive statistics results – KSE 100 index, Overall Stock Market and Terrorism Index

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Observations
PSX	0.021	0.017	0.219	-0.227	0.096	-0.053	2.584	180
TINDEX	594.858	526.000	1915.500	7.500	447.855	0.863	3.186	180

Table 2
Descriptive statistics results: Terrorist Attacks, Deaths and Injuries

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Observations
ATTACKS	72.967	57.500	280.000	1.000	58.027	1.164	4.047	180
DEATHS	131.478	111.000	513.000	0.000	105.493	1.066	3.964	180
INURIES	201.550	165.500	837.000	1.000	165.769	1.146	4.109	180



Standard deviation of PSX is higher than mean value. Literature reveals that standard deviation of stock market is always on the higher side.

Unit Root Test

This test is applied to check the stationary of variables. It was conducted based on Ducky and Fuller in (1979) and Phillips and Perron (1988) tests. Null hypothesis of this test presumes presence of unit root while alternative hypothesis indicates that variable is free from unit root problem and is non-stationary. Table 4.3, present the results of these tests for KSE 100 index, Overall Stock Market Terrorism Index. Results for overall PSX are stationary at level. But the independent variable Terrorism index stationary at 1st difference.

Table 3.
Results of Unit Root Tests for KSE 100 index, Overall Stock Market and Terrorism Index

Variable	ADF test statistics	PP test statistics
PSX	-9.947***	-10.221***
TINDEX *(at level)*	-1.719	-6.014***
TINDEX *(at 1st diff)*	-11.324***	-40.755***

1% denoted by*, 5% denoted by ** and 10% denoted by ***

Granger Causality Test

Granger causality test is used to test the cause-and-effect affiliation between two variables. Furthermore, it scrutinizes whether one variable can forecast the other variable. The results of granger causality test are appended in Table 4.

The analysis reveals that bi-directional causality exist between overall Pakistan stock exchange and terrorism index.

Table 4
Results of Causality Analysis between Overall Stock Market and Terrorism Index

Variable	Null Hypothesis: (does not Granger Cause)	F-Statistic	Prob.
Overall PSX	TINDEX → Cause PSX	2.61609	0.076*
	PSX → TINDEX	2.43838	0.0903*

1% denoted by*, 5% denoted by ** and 10% denoted by ***

ARDL Bounds Test Results

ARDL Bounds test is applied is applied to examine the cointegration between Overall Stock Market and Terrorism Index. Table 4 presents bounds test results of the

estimated F-statistics for all dependent variables (PSX). F-stat is given in the first column where terrorism index is the explanatory variable. The second column presents existence of cointegration. The p-values of all estimates are denoted by ***,**,* on f-statistics 1%, 5% and 10% respectively. Furthermore, to ensure existence of co-integration, F-value should be greater than value of upper bound for a particular significance level.

For co-integration between PSX and Terrorism Index

Table 5
ARDL Bounds Test Results

Dependent Variable	F-statistics	Cointegration
PSX	23.26891***	Yes
Significance	I(0) Bound	I(1) bound
1%	6.84	7.84
5%	4.94	5.73
10%	4.04	4.78

1% denoted by*, 5% denoted by ** and 10% denoted by ***

Bounds test is used to test the existence of long run relationship between the explanatory variable and variable to be explained. Null hypothesis of this test presumes that there is no long-term relationship between the independent and dependent variable whereas alternate hypothesis states that there is long-term relationship between variables. For a relationship to exist, the F-Statistics value must be greater then upper bound limit atleast at 10% level. For the given model Value of F- Statistic is greater than upper bounds test value at 1% level of significance. Thereby, it be statistically be said the there is a bidirectional relationship between stock market return and terrorism index in long run because of existence of co-integration among variables. Further, it's probably is verified using the wald test.

Table 6
Overall PSX Linear ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
PSX(-1)	0.205930	0.075254	2.736475	0.0069
PSX(-2)	0.120317	0.075293	1.597997	0.1119
TINDEX	3.59E-05	1.62E-05	2.224818	0.0274
C	-0.008126	0.011533	-0.704590	0.4820
R^2	0.125938			
Adj R^2	0.110868			
F-stat	8.356828			
Prob(F-stat)	0.000032			
DW stat	1.505157			
ECM (-1)	-0.67375***			
LLnTI	0.000053**			
$\chi 2_{LM}$	2.059984			

$\chi 2_{HET}$	0.385984

(1% level is identified by ***, 5% level by ** and 10% by *)

Note- This table delivers ARDL model estimation results for the changes in negative return of each stock index when trading value is independent variable. L_{LnTV} is the expected long run coefficient of the log trading value. ECM(-1) gives the speed of adjustment towards equilibrium in short run. Adj. R^2 symbolizes the value of adjusted R^2 coefficient of the estimated model. DW, $\chi 2_{LM}$ and $\chi 2_{HET}$ denote Durbin-Watson test, LM test for serial correlation and heteroscedasticity test. *, ** and *** indicate the 10%, 5% and 1% levels of significance, respectively.

Non-Linear Auto Regressive Distributed Lag Model (NARDL) Results

NARDL model is also used by authors to check the asymmetric linkages between the variables. This approach was introduced by the Shin et al. in 2014. This model is an extension to the renowned approach ARDL, this model included positive and negative series to check the hypothetical effect of one variable (becoming positive or negative) on the other variable. If the results of positive and negative series are significant, it indicates that change is one variable (positive or negative). There is different impact on the dependent variable (Luqman et al. 2018, 2019, 2020)

NARDL Bounds Test Results

This test is used to check the co-integration between Overall Stock Market and Terrorism Index. Table 4.5.2 displays results of all dependent variables (PSX). F-stat is present in the first column where terrorism index is the explanatory variable. The second column presents existence of cointegration. The p-values of all estimates are denoted by ***,**,* on f-statistics 1%, 5% and 10% respectively. Furthermore, the existence of co-integration can also be verified if the value of F-statistic is greater than that particular upper bound limit.

For co-integration between PSX and Terrorism Index

Table 7
NARDL Bounds Test Results

Dependent Variable	F-statistics	Cointegration
PSX	15.39752***	Yes
Sign	I(0) Bound	I(1) bound
1%	5.15	6.36
5%	3.79	4.85
10%	3.17	4.14

(1% level is identified by ***, 5% level by ** and 10% by *)

Bounds test is used to test the existence of long run relationship between the explanatory variable and variable to be explained. Null hypothesis of this test presumes that there is no long-term relationship between the independent and dependent variable whereas alternate hypothesis states that there is long-term relationship between variables. For a relationship to exist, the F-Statistics value must be greater then upper bound limit at least at 10% level. For the given model Value of F-Statistic is greater than upper bounds test value at 1% level of significance. Thereby, it be statistically be said the there is a bidirectional relationship between stock market return and terrorism index in long run because of existence of co-integration among variables. Further, it's probably is verified using the Wald test.

Table 8
Overall PSX Linear ARDL

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
PSX(-1)	0.227768	0.075129	3.031710	0.0028
PSX(-2)	0.126808	0.074901	1.693014	0.0923
TINDEX_POS	2.40E-05	3.07E-05	0.781053	0.4359
TINDEX_POS(-1)	-5.32E-05	4.13E-05	-1.288554	0.1993
TINDEX_POS(-2)	7.67E-05	3.22E-05	2.377186	0.0186
TINDEX_NEG	4.78E-05	2.15E-05	2.226003	0.0273
C	0.002930	0.014825	0.197640	0.8436
R^2	0.155932			
Adj R^2	0.126142			
F-stat	5.234271			
Prob(F-stat)	0.000057			
DW stat	1.976463			
ECM (-1)	-0.645423***			
LLnTI (positive)	0.000073**			
LLnTI (negative)	0.000074**			
$\chi 2_{LM}$	0.259151			
$\chi 2_{HET}$	0.977751			

Note- This table delivers NARDL model estimation results for the changes in negative return of each stock index when trading value is independent variable. L_{LnTI} is the expected long run coefficient of the log trading value. ECM(-1) gives the speed of adjustment towards equilibrium in short run. Adj. R^2 symbolizes the value of adjusted R^2 coefficient of the estimated model. DW, $\chi 2_{LM}$ and $\chi 2_{HET}$ denote Durbin-Watson test, LM test for serial correlation and heteroscedasticity test. *, ** and *** indicate the 10%, 5% and 1% levels of significance, respectively. Results shows that there is no heteroskedasticity and no serial correlation in the data.

Wald Tests - Long-run and Short-run Asymmetric test

NARDL model is also used by authors to check the asymmetric linkages between the variables. This model is an extension to the renowned approach ARDL, this model included positive and negative series to check the hypothetical effect of one variable (becoming positive or negative) on the other variable. In this paper, authors used to check whether positive or negative changes in the explanatory variable (terrorism index) causes change in the overall stock market return. Furthermore, wald test is applied to check the both short run and long run impact of these positive and negative series. The results in the table 8 appended below indicated that for short-term relationship, such relationship exists which means for a shorter time span there is asymmetric impact of stock market return due to fluctuation in the terrorist attacks. For the long term relationship, such relationship become fading, because no long run asymmetry is observed.

Table 9
Long-run and Short-run Asymmetry Tests - Return & LnTI

	Long-run Asy	**Short-run Asy**
	W_{LR} *(LnTI as IV)*	W_{SR} *(LnTI as IV)*
F-Statistics	0.342117	4.230987**

(1% level is identified by ***, 5% level by ** and 10% by *)

Note- The above narrated table delivers the outcomes of short and long run asymmetry tests for the impact of independent variable (terrorism Index) on stock market return. W_{LR} reports the long run symmetry, that checks the H_0 hypothesis of $\theta^+ = \theta^-$ for explanatory variable. W_{SR} denotes the Wald-statistic for short run asymmetry, that checks the null hypothesis that $\pi_i^+ = \pi_i^-$ for explanatory variable. *, ** and *** specify that the null hypothesis for symmetry is not accepted at 10%, 5% and 1% significance levels, respectively.

Summary of Results of Hypotheses: Accepted / Rejected

Table below presents the summarized findings for all the hypotheses proposed and tested in this study. Linear and nonlinear ARDL tests have been run to arrive at the results for hypotheses.

H_1:	**H_2:**
Accepted	**Partially Accepted**

Conclusion

This study used to find the effect of terrorism attacks over the Overall Pakistan Stock market for the period from January-2005 to December 2019. This study analyzed the relationship between stock market return and terrorism index whether symmetrical or asymmetrical.

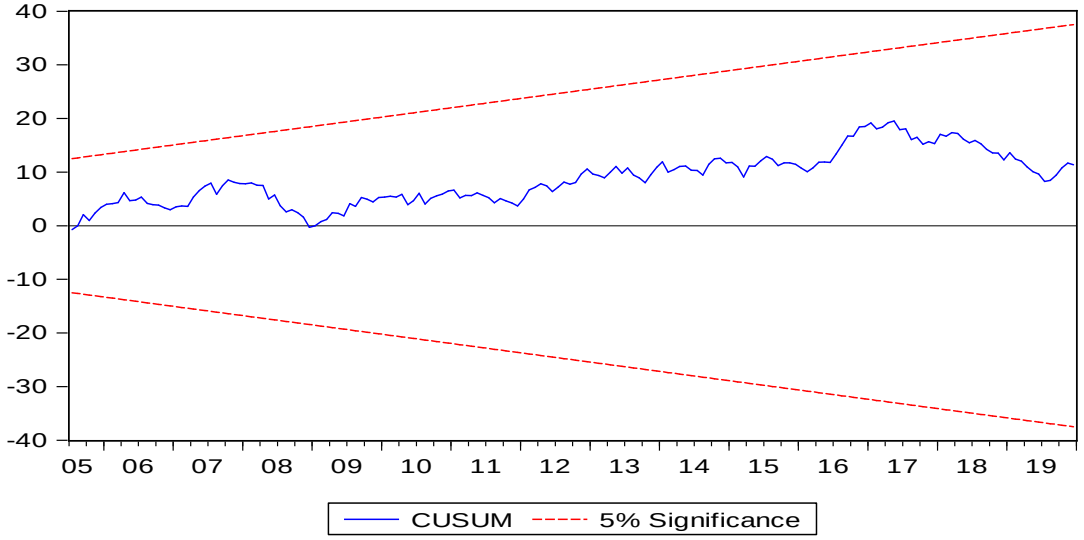
This study investigated that two way relationship between the stock return and terrorism index by employing the different statistical techniques such as Granger causality test, linear ARDL model, Nonlinear ARDL model, Short Run and Long run co-integration, bounds test and ECM (speed of adjustment towards the equilibrium)

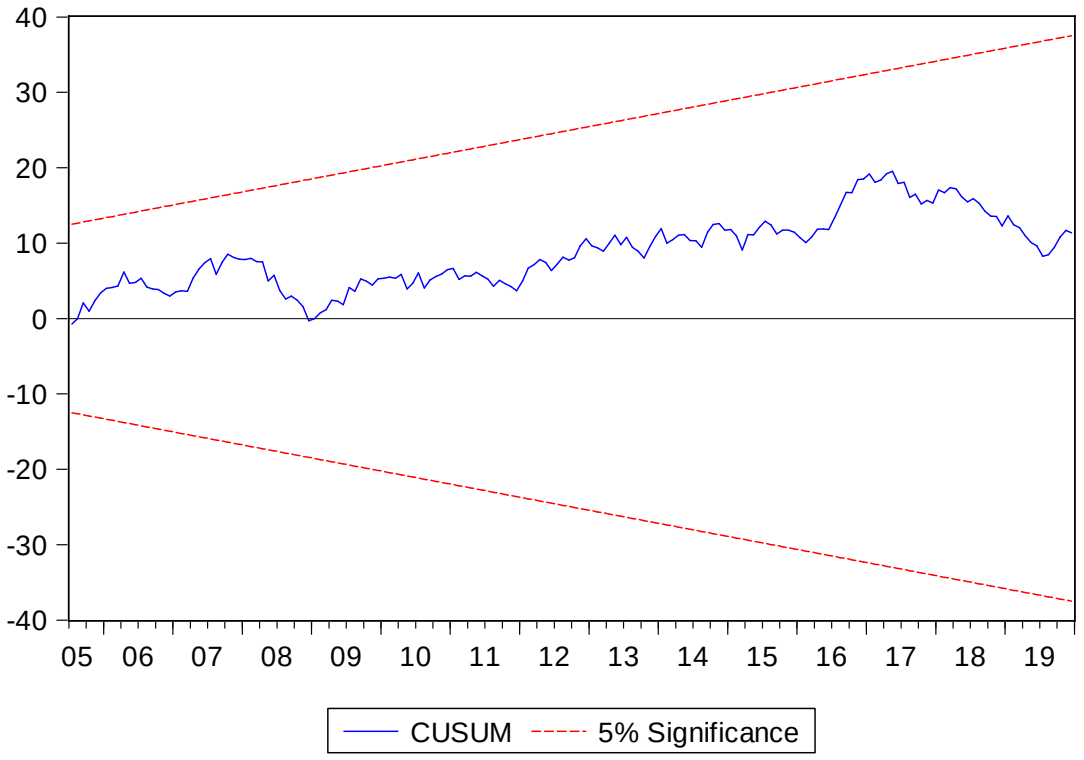
This study conducted unit root test on the initial phase. Which suggested that ARDL model should be used because the data of terrorism is non-stationary at level and becomes stationary on 1st difference. The second step was to check the grager causality. Which statistically proved that there is two way relationship between the terrorism index and stock market. ARDL bounds test confirms existence of long-run relationship between the variable as there is co-integration between them. Diagnostic tests are also found to be satisfactory. Goodness of Fit R^2 of the model is 12.6% which is due to the impact of other variables on the stock return. NARDL is also applied and the results indicated that stock market reacts to terrorism activities in the short term due to increases and decreases in terrorism activities. However, no long run asymmetry is observed.

Hence First hypothesis H1 is accepted and H2 is partially accepted as there is short run asymmetry between the variable but no long run asymmetry.

This study has time and funding limitation, which hindered the authors to select the sample. This study used all the companies registered in the Pakistan stock exchange but couldn't include international stock markets. Future research can included other countries' data and compare the results with this study. The future researches may include greater time period as this study included that data from January 2005 to December 2019 (15 years).

1. **Graphs of CUSM and CUSM sum of squares of ARDL Model**





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