
The Dynamic Interplay between Terrorism, Foreign Direct Investment and Economic Growth: Evidence from Pakistan

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Abstract

Terrorism has been a consistent issue for the last two decades in Pakistan and has impacted the economic growth of such a developing economy, which is relying on multiple IMF programs for growth and financial stability. According to the Pakistan Economic Survey (2017-2018), Pakistan has faced US\$118.3 billion in losses due to terrorism. So, this paper measures the impact of Terrorism on the Pakistan Economy using. Using the larger dataset (1970Q3 to 2015Q4) and employing the Autoregressive Distributed Lags (ARDL) model bound testing approach, this study measures the impact in the short run as well as in the long run. Further Error Correction Model is used to measure the rate of adjustment due to any economic shock. Controlling for important macroeconomic factors, the study found a significant nonlinear and negative impact of terrorism on Pakistan Economy in the long run.

Key Words: Terrorism; Economic Growth, Foreign Direct Investment; ARDL bound testing approach; Pakistan

Introduction

Terrorism has become one of the most pressing global challenges, posing serious threats to economic stability, social cohesion and national security. Until now, no effective tool has been developed to counter it at all levels. Wars on terrorism have drained the wealth of affected countries that might have been used for uplifting the living standards of rich countries and fulfilling basic needs of developing countries. Due to Pakistan's geographical location and being an ally of international forces fighting against terrorism, Pakistan has faced and is still facing a big wave of terrorist attacks. Pakistan has incurred \$118.3bn in direct and indirect losses due to terrorism, which has an annual budget of approx. \$ 40bn for 2016 (Federal Budget of Pakistan, 2016). Direct losses include loss of life, financial losses and infrastructure losses, while indirect losses include a reduction in foreign direct investment and a reduction in business activities (Ghani, 2016). Terrorist attacks not only impede economic growth but also reduce Foreign Direct Investment (FDI) by reducing investor trust (Enders & Sandler, 1996). Pakistan has a border with Afghanistan, which is the hub of armed groups/personnel.

What so ever are the reasons, terrorism is still a big problem for Pakistan's economy. Given the huge global cost of terrorism, especially in Pakistan, it is necessary to study its impact in detail;

therefore, we studied it using the latest nonlinear econometric technique developed by Shin, Y and Greenwood-Nimm (2014).

Literature Review

Extensive research has been done to measure the impact of terrorism on Pakistan's economy by adopting different linear models and using short time periods. For example (Aslam & Kang, 2015; Estrada, Park, Kim & Khan, 2015; Ghani, 2016; Ismail & Amjad, 2014; Kfir, 2014; Khan, Estrada & Yusof, 2016; Malik & Zaman, 2013; Procasky & Ujah, 2016; Shaffer, 2017; Shahbaz, 2013; Shahbaz, Shabbir, Malik & Wolters, 2013; Shahzad, Zakaria, Rehman, Ahmed & Fida, 2016; Syed, Saeed & Martin, 2015) studied impacts of terrorism in one way or other and found that terrorism is significantly impacting economies of the world including Pakistan.

However, all the above studies measured this impact using linear methods and found mixed results; in some cases, there is an impact and in some cases, there is no impact. Malik and Zaman (2013) examined the macroeconomic consequences of terrorism on Pakistan. The authors used annual data from 1975 to 2011 and, by applying co-integration theory, the Granger causality test and variance decomposition, found that political stability, price level and population growth are causes of terrorism. Further, this study found that income inequality, unemployment and financial openness have no impact on terrorism. Price level changes are the most important factor and poverty is the least important factor influencing terrorism.

The relation between inflation, terrorism and economic growth was evaluated by Shahbaz (2013) by using annual data from 1971 to 2010. The researcher found that an increase in the inflation rate and economic growth are major sources of terrorism in Pakistan. The author used the ARDL bound testing approach and VECM Granger causality for robustness. Working on causal relations, Shahbaz et al. (2013) analyzed the causal relationship between economic growth and terrorism for the period 1973 to 2010 by incorporating capital and trade openness in the production function. They used annual data, the VECM Granger Causality approach and confirmed that economic growth is Granger-causing terrorism. However, a feedback effect is found only between terrorism and trade openness.

Mehmood (2014) analyzed data from 1973 to 2010, comprising 4,500 terrorist attacks/incidents and 10,200 deaths, using a quasi-structural VAR, Granger Causality, Impulse Response Functions and a VECM. The author studied terrorism and Pakistan's macroeconomy. The study concluded that terrorism incurred a cost of 33.02% of Pakistan's real national income. More precisely, terrorism incurred the cost of 1% of real GDP and per capita growth per year.

Ismail and Amjad (2014) worked broadly to determine the factors of terrorism in Pakistan. They analyzed the long-run relationship between GDP per capita, unemployment, political rights, inflation, literacy level, poverty and inequality using annual data from 1972 to 2011. To measure the long-run integration, they used the Johansen co-integration technique. To measure stability in long-run integration, the authors used the ECM technique. By applying impulse response analysis, it was concluded that some variables have increasing trends, some have decreasing trends, while a few remain constant. Results revealed that an increase in GDP increases terrorism, an increase in poverty increases terrorism and an increase in inflation increases terrorism, while an increase in literacy decreases terrorism.

Aslam and Kang (2015) studied the impact of terrorism on the Pakistan Stock Exchange using different methods and 13 dummy variables. The authors used time series data from 2000 to 2012 on a daily basis, which was missing in the literature. They used event study methodology to check the impact of terrorism on the stock exchange. They found that terrorist attacks impact the Pakistan stock exchange for a short period and the stock exchange recovers in just one day. They found that the impact depends on the location and type of attack. One interesting finding of this study was that the stock exchange predicts terrorist attacks.

Syed et al. (2015) explored causes of terrorism in Pakistan. This study used pooled cross-section time-series data from across Pakistan and used fixed-effects negative binomial regression. They found that local military operations, expenditures on public education, expenditures on law and order situation improvements, ethnic diversity, the population residing in cities and even the aid of the U.S. military to Pakistan are all causes of increased terrorist attacks/activities in Pakistan. Estrada et al. (2015) used the terrorist attack vulnerability evaluation model (TAVE-Model). In this model, terrorism is analyzed in three phases: the origin of terrorism, terrorism itself and post-terrorism effects. Further TAVE model identifies terrorist attacks intensity, level of terrorist attacks monitoring, economic degrowth ($-\delta$), (α_i), terrorist attack losses ($-\pi$), economic wear (Π), intensity of terrorist activities, level of terrorist attack tension (ζ) and total economic leaking (Ω_t) under a terrorist attack. This model shows that if GDP growth is small, total economic leakage will impact economic growth, while it has less impact in the case of high GDP growth.

Shahzad et al. (2016) studied foreign direct investment (FDI), terrorism and economic growth in Pakistan. They used quarterly data from 1988 to 2010 and examined co-integration and causal relationships among the above-mentioned variables. They divided the study into two segments, i.e., 1988 to 2001 and 2002 to 2010. They found long-run co-integration between FDI, terrorism and economic growth. They found bidirectional causality between FDI and economic growth using variance decomposition and impulse response analysis. Further, they found that terrorism is deteriorating effect on FDI.

Khan et al. (2016) studied terrorism in Pakistan by applying the Economics of Crime Monitoring Model (ECM Model) Ruiz Estrada and Ndoma (J Policy Model 36:867–882, 2014). ECM Model is used to measure the impact of terrorism on the economy of Pakistan. They found that terrorism causes economic degrowth of about -0.04% in 2000, while in 2013 it is -1.71%. They further concluded that terrorism could cause economic growth, while the reverse is not true.

Apergis and Apergis (2016) explored the impact of the Paris terrorist attacks on the global defense industry by selecting 24 global defense companies. They adopted event study methodology to test this hypothesis by selecting an event window of $[-5, +5]$. They found significant reaction on the terrorist attacks day and the following day in those countries where the stock market was closed at the time of the attack. Procasky and Ujah (2016) checked the impact of terrorism on the sovereign risk of 102 countries, which in turn impacts the credit rating of these countries and results in increased cost of debt. They further concluded that this impact is greater in developing countries than in developed countries. This incrementally costs of debt further impact different companies operating in that country.

The impact of terrorism on Pakistan's banking sector was analyzed by Ghani (2016), selecting 14 commercial banks listed on the Pakistan Stock Exchange. They followed event study methodology, considering an event window of $[-15, +15]$ days. The authors checked the impact of two main terrorist attacks in Pakistan and found that average abnormal returns and cumulative average abnormal returns of a banking sector stock are significant in the case of a terrorist attack on Army Public School in Peshawar.

Hye et al. (2013) worked on tourism and economic development of Pakistan. They used annual data from 1971 to 2008 by applying Johansen-Juselius co-integration, the ARDL model and the rolling window bound test. They found that income from tourism and economic growth have a long-term relationship. Further, they found that during 2006, 2007 and 2008, there was no relationship between income from tourism and economic growth.

In conclusion, the literature review found that terrorism has impacted economic growth, banking sectors, foreign direct investment and the sovereignty of affected countries. Further, we found in the literature that increased economic growth, poverty, inflation rate, political stability, population, foreign aid and ethnic diversity are major causes of terrorism in Pakistan. These results have been found by different researchers applying different statistical models and using

datasets with different frequencies and durations. One important result also suggests that the impact of terrorism is greater in developing countries than in developed countries (Procasky & Ujah, 2016).

The study employs an ARDL bound testing approach to determine the long-run and short-term relationship between terrorism and Pakistan's economy. Further, this study be using all major economic growth variables as control variables to capture the impact of terrorism precisely. We found few studies in the literature that control for growth variables, while this study measures the impact of terrorism on Pakistan's economy. We will be using the largest dataset from 1975 to 2015 to measure this impact.

Methodology

Data on Foreign Direct Investment and Real Gross Domestic Products is collected from the World Development Indicators (WDI) database maintained by the World Bank. Terrorism data are collected from the Global Terrorism Database¹ which reports the number of killings in each quarter. The study period is 1970Q3 to 2015Q4. Table 1 describes the summary statistics of the variables and Table 2 describes the results of stationarity tests.

This study used the Autoregressive Distribution Lag (ARDL) model developed by Pesaran, Shin and Smith (2001). ARDL model was developed to incorporate variables under study that are not stationary at the same level, i.e., a few are stationary at level but a few at first difference. If the variable is stationary at the level, then we can use simple OLS, but the issue arises when variables under study are stationary at different levels. High t-scores are generated if we study variable stationarity at different levels. To apply the ARDL model, stationarity of the variables is checked; the dependent variable must be non-stationary; no variable should be stationary at the 2nd difference; and, in case of structural breaks, no variable should be stationary at the 2nd difference. First, we check for optimal lags to be included in our model by AIC criteria; study applied the Augmented Dicky Fuller (ADF) and Phillips-Perron (PP) tests for stationarity of any variable that must not be of 2nd difference and lastly, variables must not be sensitive to structural breaks. We used economic growth variables as suggested by the literature and the following control variables to measure the impact of terrorism on the economy of Pakistan. (Borensztein, De Gregorio & Lee, 1998) found that foreign direct investment is an important factor contributing more to economic growth than domestic investment. Balassa (1978) found that exports are important factors for the economic growth of developing countries. Knack and Keefer (1995) suggested that property rights significantly impacting economic growth of any country. We dropped Exports due to multicollinearity with Foreign Direct Investments.

$$RGDP_t = \alpha_0 + \beta_1 No. of Killings_t + \sum_{i=1}^n \gamma_i Control_t + \varepsilon_t$$

Where indicates the Real Gross Domestic Product of Pakistan, indicates the total number of killings due to terrorism in a quarter, indicates net Foreign Direct Investment towards Pakistan in each quarter, which comes under control variables; our detailed model is as below:

$$\Delta RGDP_t = \alpha_0 + \sum_{i=1}^{n1} b_i \Delta No. of Killings_{t-i} + \sum_{i=0}^{n2} c_i \Delta FDI_{t-i} + \alpha_1 No. of Killings_{t-1} + \alpha_2 FDI_{t-1} + e_t$$

¹ The Global Terrorism Database (GTD) is an open-source database including information on terrorist events around the world from 1970 through 2016 (with annual updates planned for the future). Unlike many other event databases, the GTD includes systematic data on domestic as well as international terrorist incidents that have occurred during this time period and now includes more than 170,000 cases.

Variables shown with a differenced symbol will determine error correction movements, while with α_s show the long run-relationship.

Discussion of Results

Table 1 describes the summary statistics of the variables that are used in this study. We do not find any outliers in these variables.

Table 1: Summary statistics for key variables under study

Summary statistics for key variables used in this study in original form are given below. These include the period from 1970Q3 to 2015Q4 and are taken on a quarterly basis. These variables are taken from World Development Indicators developed by the World Bank.

Table 1: Summary Statistics

Variables	Mean	Median	S.D	Min	Max	Obs
No. of Killings	118	24	203.21	0.00	909.00	182
Real GDP	57.33	52.56	32.92	15.48	103.63	182
FDI	0.75	0.52	0.82	-0.08	3.71	182

Table 2 describes the results of the ADF and PP tests to check the stationarity of the variables. All variables are stationary at the level or in first differences, which is required for the ARDL bound testing approach.

Table 2: Unit Root Test at level and 1st difference

Results obtained using the Augmented Dicky Fuller (ADF) and Phillips-Perron (PP) methods for variables included FDI, Real GDP and No. of Killings for the period 1970Q3 to 2015Q4. Lag length is based on Schwarz Information Criterion (SIC). Critical values are -3.91, -3.42 and -3.13 at 1%, 5% and 10% levels, respectively.

Variables	ADF with trend and intercept		Phillips-Perron Test with trend and intercept	
	At level	1 st difference	At level	1 st difference
No. of Killings	-1.63	-14.13***	-2.50	-23.39***
GDP	2.21	-0.33***	5.64	-2.91**
FDI	-2.56	-3.49***	-2.10	-5.62***

Table 3 describes the F-statistics of the ARDL model when Real GDP is the dependent variable. The F-statistic values are greater than the critical values, confirming that there are long-run and short-run relationships among GDP, FDI and terrorism.

Table 3: F-statistics of ARDL Model

F-statistics are used to test the existence of long-run and short-run relationships among FDI, Real GDP and the number of Killings in Pakistan and are calculated using the ARDL bound testing approach. ARDL model is selected by the AIC criterion, where the dependent variable is Real GDP (RGDP) and the independent variables are FDI and the number of killings for the period 1970Q3 to 2015Q4. The model is selected on AIC. *** The asterisk shows the significance of results at 1 percent level. The critical values for upper and lower bounds are taken from (Pesaran et al., 2001) Table CI (ii) Case II.

Dependent Variable	Model Lags	F-Stat	Lower bounds I(0)	Upper bounds I(1)	Level of Significance
RGDP	(3, 0, 2)	6.16***	4.41	5.52	<5%

Table 4 discusses the estimates and direction of impact among the variables in detail. The best model selected by the AIC criterion is (3,0,2), which means three lags of RGDP, no lags of Terrorist attacks and two lags of FDI are significant to consider in this model. We used the maximum lags to capture the impact of terrorism.

Table 4: Estimation of linear ARDL

This table shows the results of the ARDL bound testing approach, where RGDP is the dependent variable, while FDI and No. of killings are independent variables.

Panel A: Short run			
Independent variables	Lags		
	0	1	2
RGDP	-	0.60***	0.15*
No. of Killing	-0.0002	-	-
FDI	-0.13	0.30*	-
Panel B: Long run			
RGDP	No. of Killings	FDI	
0.008**	0.04**	16.62**	

Figure 1 and Figure 2 show the CUSUM and CUSUM graphs as robustness checks of model stability. The model is found stable on the long-run.

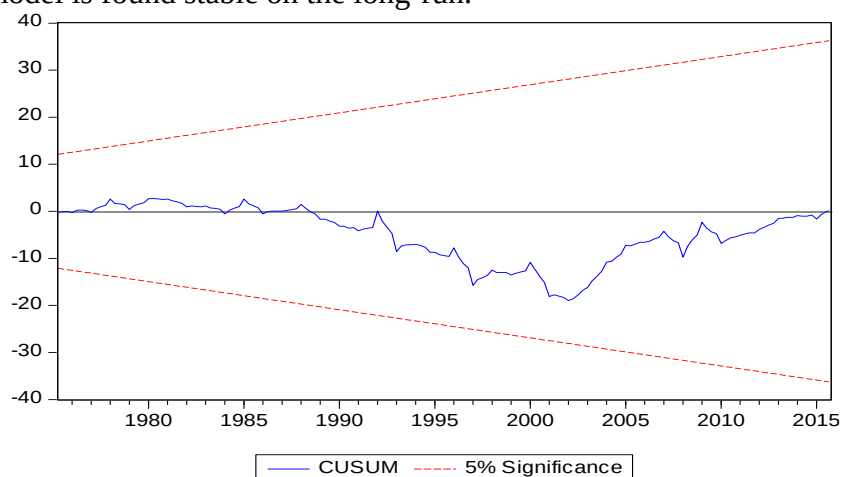


Figure 1: CUSUM sketch of ARDL model stability.

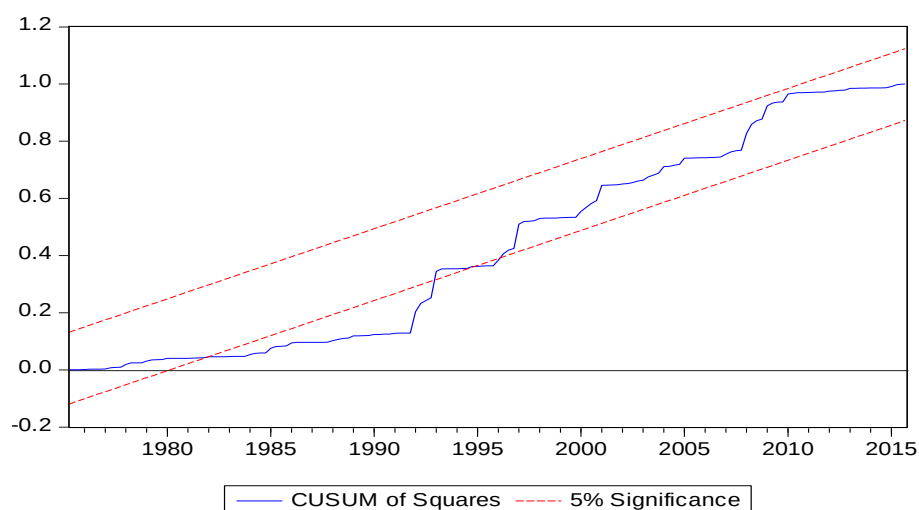


Figure 2: CUSUM of square sketch of ARDL model stability.

Conclusion

The study found that there is no short-run relationship between terrorism and the Pakistani economy, while there is a positive and significant long-run relationship. These results are also supported by the literature (Shahzad et al., 2016; Syed et al., 2015; Ismail & Amjad, 2014), which describes a positive and long-run relationship between the Pakistan Economy and Terrorist attacks. FDI has been found to be a positive and significant predictor of Pakistan's real GDP. In event studies, there is a short-run impact on the stock exchange, but we explored the long-run relationship between the Pakistan economy and terrorist attacks.

This study contributed to the literature by using maximum lags of the variables under study and controlling for growth variables using the ARDL bound testing approach, which has not been used in earlier studies. We used the largest dataset in our study. Further, this study can be extended by adopting an asymmetric relationship between terrorism and Pakistan's GDP using the NARDL bound testing approach. Moreover, the determinants of the positive relationship between economic growth and terrorism may be explored to kill this wave of terrorism.

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