Determinants of Terrorism in Pakistan: A Time Series Analysis

Haseebullah Khan
Abstract

This present study examines the relationship among the terrorist incidents, fluctuations in economic growth, and the role of literacy rate in a politically repressed setup in Pakistan. For this purpose, it makes the use of time series data over the period of 1972-2008. The Johansen method of co-integration is used to show the linkage of variables in the long run. The study concluded that economic conditions are not the drivers of terrorism in the long run. The studies further investigate that the positive relationship of education with terrorism can be justified in two ways. Firstly, education delivers awareness in people about the injustices. If no appropriate platform is available for discussion on issues; it results in violence. In addition, terrorist organization demands higher educated people because the educated person will easily adjust in changing environment. Furthermore, it is also evident from the study that there is non-linear inverted U-shape relationship between political repression and terrorism in the long run.
Acknowledgement

First of all, I would like to pass the gratitude to my supervisor Magnus Wikström. Thanks for his great supervision. I could not have finished this study without his valuable advice.
Secondly, I would like to thank the school, Umeå University. Thanks for offering me the opportunity to study here, as well as grateful gratitude to all the teachers and nice classmates.
Last but not least, I am deeply grateful to my parents who have been encouraging and motivating me throughout my study in Sweden. Without their support spiritually and financially, I could not have finished my study abroad.

Thank you sincerely!
Haseebullah Khan
1. INTRODUCTION

The question to understand the causes and consequences of war and peace, conflict and harmony, and violence and serenity has been an old perception among economists, academicians, researchers, and politicians; as these situations can be detrimental or catalyst respectively to economic growth and prosperity of the economies. In the period after the last two World Wars (WWI and WWII), policy makers and economists focused intensely on the economic stability of nations. This has a significant positive correlation with peace and harmony. They sought to outline both theoretically and empirically the interactions between war, peace, and economic well-being of the economy. However, after the September 11, 2001, the world faced a new type of war, called terrorism, which can be fought from the backdoors. Post September era compelled researchers to dig into the underpinnings and rigor of the causes and consequences of terrorist incidents and anti-terrorism policies; as this hidden war costs precious human lives, economic resources, and psychological fear and terror among individuals (which leads to productivity loss).

Terrorism is defined as “the premeditated use or threat of use of extra normal violence or brutality by sub-national groups to obtain a political, religious, or ideological objective through intimidation of a large audience, usually not directly involved with the decision making” (Enders and Sandler, 2000). Crenshaw (1981), writes about the terrorism that it occurs in the context of violent resistance to the state/country as well as in the service of countries interest. Nevertheless, it can be changed depending on the interests of small violent groups. It may happen due to nationalist demand for a separate state, to get legitimate social, economic, and political rights within the state, impose extreme form of a specific religious doctrine, and last but not the least, foreign funded intervention in a neighboring countries, etc.

Since September 11, 2001, the whole world is under threat due to the war from various terrorist organizations. Subsequently, Pakistan is not an exception to be safe from the terrorist incidents. Due to the hostile neighbors (especially India and Afghanistan), geo-political importance, diverse ethnicity and culture, weak political, economic, religious, and social institutions, etc., Pakistan is the country in the world? That is most affected by terrorism. According to the figures of South Asian Terrorism Portal, more than 33,000 casualties and fatalities have been recorded
during the time period 2003-2011. The terrorists’ incidents and war on terror charged Pakistan a collective loss of around $68 Billion (Pakistan Economic Survey, 2010-11).

Despite of mammoth cost of terrorism to the Pakistan’s economy, so far, few attempts have been made to discover and identify the potential determinants of terrorist incidents in Pakistan [Nasir et al., 2011 and Nasir et al., 2012]. The present study aims at filling this gap. The foremost objective of the study is to test the influence of important economic, political, and social determinants of burgeoning terrorist incidents in Pakistan. More specifically, per capita GDP captures the economic situation; political repression represents political conditions; and literacy rate confines to social environment of the Pakistan’s economy. Both long and short-run impacts and dynamics of the above determinants on terrorist incidents have been analyzed through Johansen Method for Co-integration 1 for the period 1972-2008.

The study concludes that the economic factor (per capita GDP) is not a significant contributor both in the short and the long run to the high number of terrorists’ incidents. Political factors (political repression) exhibits an inverted U-shaped relationship with terrorism in the short-run; terrorist events increases initially, reaches maximum, and then starts declining with the increase in repressiveness of the government. Nonetheless, in the long-run, it (political repression) demonstrates a U-shaped correlation with number of terrorist targets; initially decreases, reaches minimum, and then increases with the increase in government political oppressiveness. And lastly, literacy rate has no significant impact on the number of terrorists’ assaults in the short-run, but is marginally significant in the long-run.

The rest of the study proceeds as follows: section 2 includes a brief history about the background of terrorism in Pakistan, section 3 provides brief portrayal of the literature review on this issue. Section 4 gives details of Econometric Methodology and data construction. The results and discussion are put forward in section 5. And sections 6 conclude and suggest some policy implications for the study.

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1“The Johansen method of co-integration is employed to the series of same order of integration. This method is useful in two manners: first it tests for the existence of long-run relationship among the variables and second it provides us the long-run coefficient estimates of the variables” [Nasir et al., 2011]
2. Background

Pakistan came into being on 14th August, 1947. It was declared as Islamic Republic of Pakistan in the constitution of 1956. Pakistan is struggling since its independence to cope with various problems like war, political instability, corruption, poverty and terrorism etc. In past, it has also provided a shelter for the war victims refugees from Afghanistan and Bangladesh. Pakistan shares its border with countries like India, China, Iran and Afghanistan. To secure and make friendly relations with their neighbors is the first priority of the country to counter the terrorism activities. According to Akhtar (2008), due to Afghan-Soviet war (1979-1989), it was reported that Pakistan officially supported Taliban. In this war against Soviet unions, millions of refugees came to Pakistan. Creation of arms and insurgencies and local arms race are consequences of Afghanistan war. When the soviet failed to overcome the situation, Taliban took the advantage and they were successful in taking charge of Afghanistan in 1996. (Akhtar 2008).

Pakistan was under the influence of dictators for many years. Ansari (2011) discussed that the era of General Ayub Khan in 1960s was governed in an authoritarian manner, who believed in progressive-liberal and modern version of Islam. The Government of General Zia ul Haq during 1977-88 witnessed a program of force Islamization in the country. Ayub Khan tried hard to introduce some legal, constitutional and social changes in the country on the basis of his modernistic views of Islam through public policies. This led him to face contradictions from the religious scholars. By the end of 90’s, Army took over the civilian government and General Pervez Musharraf became a third dictator of Pakistan. He led the military government from October 1999 till August 2007.

It is believed that the terrorist groups take birth from religious extremism. As these groups represent a minute class in society so they are unable to attain sufficient representation in the parliament. On the other hand, they have access to huge funds received in the form of Zakat and Sadaqa. It becomes an easy jog to form some undercover groups to attain their unlawful motives; which is very common in South Asia. These religious institutions also run the informal education centers named as Madrassahs. Other than instructing the enlightening values of Islam

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2 Zakat is an obligation on every Muslim; they have to pay a specific amount from his/her savings.
3 Sadaqa is a voluntary act of giving money or any other things for the sack of good will(for the cause of God).
4 School where teach mostly Islamic subjects leading to graduation
to the pupils, they are fed with violent ideas and literature. These religious institutions look contemporary developments in the education as a threat to their ideology. Educational reforms in favor of western literature and culture can exacerbate the terrorism activities since it is against their ideology and culture of these militants. In response, they are likely to dampen the human and the physical infrastructure. The extreme case of this violent oppression appears in the form of bomb explosions in educational institutions. In this way, they discourage students from attaining school education. As, the terrorist groups consider that female education is desecration of religion, the incidence of the terrorism activities escalate with the rise in female education. They explode the girls’ educational institutions to stop the rising trend in female education (Looney 2004).

One important ingredient for the rise in terrorist activities is rising income inequality in Pakistan. Almost all the recruited terrorists belong to the low income class of the society. Reducing the income disparities and a broad development in the social infrastructure might reduce the terrorist incidents in Pakistan. To capture the impact of income fluctuations on the terrorist activities, present study makes the use of per capita Gross Domestic Product (GDP) which represents the economic activity in Pakistan. A higher per capita income is an indicator of rising standard of living and vice versa. Increasing levels of income results in more opportunities to the masses in country towards a more comfortable and social life. They are less likely to involve in the terrorist and anti-social activities for the monetary rewards.

Another important parameter for the terrorism is literacy rate. Siddique. B et al (2011) said about literacy that It is a basic parameter to index the social development of the society. It is also a reason of social probems like crime rate, political unawareness and terrorism. In the basic study of Choudhry.A.M, (2005) includes that in Pakistan adult literacy was rising issue in 1972 and 1979. To takel the issue a commission was established named ‘literacy and mass education’ the basic purpose of the commission was to promote literacy but this commission was faild to prompte the theme purpose due to lack of resources. Another policy was introduce in 1998 named ‘national education policy (1998-2003)’ to fix the adult literacy target of 55% by 2003 and 70% by 2010.

A relative fall in the number of terrorist’s incidents strengthens the government, and this evil becomes easy to control. In contrast, these circumstances are no more favorable to the terrorist groups. The persistent rising per capita income is primary and the most significant
solution to the terrorist activities. In extreme cases, these extremist militants are reported to fight guerilla combats and open wars if state has lesser control over militant insurgency. This result in devastating situation, the most striking example is the tactics adopted by the Afghan Taliban’s who are fighting against the United States and NATO forces.

Literature on conflict unearths that depriving the people from their civil and the political rights also results in rise of violence and terrorist activities in any society. To be more specific, such society is known as political repress (political discrimination) society. Depriving masses of their civil rights might lead them to join the militant groups. They might ignite the violence in the society to gain the attention of the government and the lawmakers. If some military government is ruling the government, it might be difficult for these militant groups to mobilize their weapons in the initial stages. Later on, the aggrandize social moments against such oppression will become more severe. Over time, anti-government activities will breed and the militant would be more dangerous to the society.

Finally, it very is important to discuss the so called war on terror imposed by the United States (US) on Afghanistan and the role of the Pakistani government in this arena. After the US invasion in Afghanistan in the year 2001 in response to the destruction of 9/11, this term war on terror has become proverbial in literature. Pakistan chose to be the front line partner in this war, as it shares a long border with Afghanistan. But war always comes with heavy costs which eroded not only the physical infrastructure but also affected the social norms in the society. This resulted in the emergence of the Pakistani Taliban.
3. LITERATURE REVIEW

Theoretical and empirical literature on determinants of terrorism is though rich yet differ a lot in its findings. In view of Enders and Sandler (2000) the long-run relation among the variables specify that terrorist’s incidents is endogenous variable while economic growth, literacy rate and the political repression are the controlled variables in the system. It is important to define terrorism before the formal introduction of the theoretical framework. The intentional, planned, and extreme violence by threatening a large number of people for the attainment of religious, political and the ideological ambitions is called terrorism. When we talk about the causes behind the terrorist’s attacks, several factors are thought to be involved. Some of them might be income inequality, lack of education, political unrest, poverty etc. First baseline study in this direction was provided by Gurr (1970) that focused on the significance of microeconomic determinants such as poverty and inequality. On the other hand, Tilly (1978) considered that political and structural differences among country are the main cause of terror incidents. Later on, further work was preceded by Muller and Seligson (1987) in this direction who predicted that income disparity and mal-distribution of land are the driving force behind conflict and terrorism. It found that the former is more significant predictor of political violence as compared to the later one.

Education is not only information but formation. It gives awareness and makes an individual civilized with better social and economic living conditions. In a study Krueger and Maleckova (2003) discusses about the relation between education and poverty. The study found that higher education or poverty has little direct relationship with terrorism. They argued that most members of Hizbullah’s militant wings are from economically advantage and educated families still the members of theses extremists groups were involved in a number of terrorist activities. Further explaining the issue of terrorism, Abadie (2004) reported that country level terrorism risk has no direct link with economic variables, but there are some indirect links when political freedom are taken into account. Testas (2004) concluded that civil wars, income per capita, and education also plays a vital role in terrorism, which is a rising and controversial issue. Piazza (2006) raises a very important question that population diversity and structure of party politics are very much involved in the political violence.

Education should be considered as an important contestant to improve the country’s human capital. Nevertheless, the aid replaces religious schools with secular schools and contemporary schools also reduce terrorism. Azam and Thelen (2008) focused on the importance
of education and discussed that aid for education should be granted instead of general budget support to reduce the terrorism in a country. As in Pakistan less attention is paid on education and fewer budgets are allocated for education sector. There is a strong need to uplift education in order to spread awareness and to fight with poverty. Nasir et al. (2011), undertake the South Asian region and studied that literacy and repressions are significant sources of terrorism in South Asian region. Most of the literature has focused on the indirect role of foreign aid on violence through education. Functional relationship between terrorism and political freedom is non-linear; Hamilton and Hamilton (1983) analyzed that poor institutional framework, lesser democracy, poverty and lack of education intensifies terrorism.

Theoretical and empirical underpinning on the relationship between aid and terrorism is very rare. The event of September 11 compelled the analysts to concentrate on the foreign assistance and terrorism violence. Grahm (2002) added a productive work on the issue and analyzed indirect effects of foreign aid on terrorism which eradicates inequality, poverty and attaining a high standard of living. The study argued and explained that foreign aid is not helpful in short-run to reducing poverty, inequality and improving the standard of living but it is more beneficial in the long-run.

Income inequality may cause conflicts and violence in a society followed by aggression, fighting and hostility. London and Robinson (1989) focuses on the cross country data for the year 1968-1977 to show the impact of income inequality. He argued that this factor bring significant violence in the society. The study focused on the multinational companies; which identified that the influence of these international companies on the income inequality of the domestic economy causes political conflict and violence. Nationalist groups also contribute a lot in conflict, Blomberg et al. (2002), took a panel data set of 127 countries from 1968 to 1991. They focused its economic implications on inequality and the terrorist incidents; it revealed that economic inequality and nationalists movements significantly affect the magnitude and level of political violence in those states which are not economically strong. Fearon and Laitin (2003) found that poverty, political instability, environmental degradation, and large populations are the root causes of violence.

On the other hand, international trade, foreign direct investment, and portfolio investment are also important. Li and Schaub (2004) studied a sample of 112 countries from 1975 to 1997 and based on pooled time series, cross section data. The study found that trade, FDI and portfolio
investment of a country cannot directly increase terrorist incident within the country borders. Religious extremists are considered as the main cause of violence but Bravo and Dias (2006) claims that it is not a main determinant of terrorism. Moreover, the research showed that low human development index (HDI) calculates higher terrorist attacks.

In coda; it may not be possible to generalize and draw one solid conclusion from the literature on the potential factors and determinants of terrorism since the results are specific to different regions, time periods, and econometric techniques.
4. Methodology and Data

This study examines the relationship between the terrorist incidents, fluctuations in economic growth, and the role of literacy rate in a politically repressed setup. The present study makes the use of time series data which requires a stationary set of variables. Stationarity is a basic requirement for all variables to avoid the problem of spurious regression. Employing the Ordinary Least Square (OLS) will bring meaningless results if the data is non-stationary. It would procure false results as the correlation would be meaningless. Although differencing will convert the non-stationary variables in stationary form but it also results in the loss of long-run information in the data (Nasir et al, 2011).  

For a concrete analysis, it would be better to use the data in its actual form. The ongoing econometric literature has solved this problem up to much extent. In this regard, Cointegration techniques provide the robust results if the data is nonstationary in the level form. It not only preserves the long-run information but also lessens the risk of spurious regression. The Johansen Cointegration technique is more appropriate if all the variables inherit the same order of integration, I (1). This procedure provides two advantages. First, it examines the long-run relationship between the variables. Second, estimated coefficients are robust in the sense that estimation is conducted in the presence of long-run information (Nasir et al, 2011).

Cointegration analysis is basically a multivariate analysis because a single variable cannot be considered cointegrated. If we assume some integrated variables that include gasoline prices prevailing at different locations and both of the gasoline prices are I(1). In this situation, cointegration between the given set of variables could possibly arise if the price differentials were stationary.

Though cointegration tell about the long-run relationship between the variables but it does not indicate direction of causality. In the above example, one given locations might could a price leader while the others might be the followers and vice versa. First case indicates that leading location would drive prices of all the other locations. Then, cointegration might be analyzed from the set of equations that represent other adjusting prices. in this context, the former price would be treated as a given price.

In the other case, when there is no price leadership, all prices would be adjusting the equilibrium and form a cointegration relationships. Bivariate cointegrating analysis is formed in

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a single equation model (Hendry and Juselius, 2000). The present study used the following equation which is suitable to uncover the long-run relationship among all these variables. It is as follows:

$$INC_t = \alpha_0 + \alpha_1 GDP_t + \alpha_2 LIT_t + \alpha_3 PR_t + \alpha_4 PR^2_t + \varepsilon_t$$  \hspace{1cm} (1)$$

Where $INC_t$ represents log natural of terrorist incidents; $GDP_t$, $LIT_t$, $PR_t$ and $PR^2_t$ stand for log natural per capita GDP, literacy rate, political repression and the final term denotes its square respectively. In addition, $\varepsilon_t$ symbolizes the white noised error term.

Given the presence of long-run information, there must be some short-run relationship among the variables. This short-run relationship would bring stability in the system if the stability is lost owing to the face of some exogenous shock. Vector Error Correction Mechanism (VECM) provides the information about the short-run estimates, given that the long-run coefficients have been estimated.\(^6\)

It proceeds with a restricted Vector Auto-regression (VAR) framework whereas the restrictions are imposed on the basis of a stable long-run relationship. Vector Error Correction Mechanism (VECM) provides a system of equal number of equations as that of variables. All the variables in principle are treated as endogenous in this technique. The VECM is as follows:

$$\Delta INC_t = \alpha_1 + \sum_{i=1}^{p} \beta_{1i} \Delta INC_{t-i} + \sum_{i=1}^{q} \beta_{2i} \Delta GDP_{t-i} + \sum_{i=1}^{r} \beta_{3i} \Delta LIT_{t-i} + \sum_{i=1}^{s} \beta_{4i} \Delta PR_{t-i} + \sum_{i=1}^{t} \beta_{5i} \Delta PR^2_{t-i} + \lambda_1 EC_{t-i-1} + u_t$$  \hspace{1cm} (2)$$

$$\Delta GDP_t = \alpha_2 + \sum_{i=1}^{p} \beta_{6i} \Delta INC_{t-i} + \sum_{i=1}^{q} \beta_{7i} \Delta GDP_{t-i} + \sum_{i=1}^{r} \beta_{8i} \Delta LIT_{t-i} + \sum_{i=1}^{s} \beta_{9i} \Delta PR_{t-i} + \sum_{i=1}^{t} \beta_{10i} \Delta PR^2_{t-i} + \lambda_2 EC_{t-i-1} + u_t$$  \hspace{1cm} (3)$$

$$\Delta LIT_t = \alpha_3 + \sum_{i=1}^{p} \beta_{11i} \Delta INC_{t-i} + \sum_{i=1}^{q} \beta_{12i} \Delta GDP_{t-i} + \sum_{i=1}^{r} \beta_{13i} \Delta LIT_{t-i} + \sum_{i=1}^{s} \beta_{14i} \Delta PR_{t-i} + \sum_{i=1}^{t} \beta_{15i} \Delta PR^2_{t-i} + \lambda_3 EC_{t-i-1} + u_t$$  \hspace{1cm} (4)$$

$$\Delta PR_t = \alpha_4 + \sum_{i=1}^{p} \beta_{16i} \Delta INC_{t-i} + \sum_{i=1}^{q} \beta_{17i} \Delta GDP_{t-i} + \sum_{i=1}^{r} \beta_{18i} \Delta LIT_{t-i} + \sum_{i=1}^{s} \beta_{19i} \Delta PR_{t-i} + \sum_{i=1}^{t} \beta_{20i} \Delta PR^2_{t-i} + \lambda_4 EC_{t-i-1} + u_t$$  \hspace{1cm} (5)$$

$$\Delta PR^2_t = \alpha_5 + \sum_{i=1}^{p} \beta_{21i} \Delta INC_{t-i} + \sum_{i=1}^{q} \beta_{22i} \Delta GDP_{t-i} + \sum_{i=1}^{r} \beta_{23i} \Delta LIT_{t-i} + \sum_{i=1}^{s} \beta_{24i} \Delta PR_{t-i} + \sum_{i=1}^{t} \beta_{25i} \Delta PR^2_{t-i} + \lambda_5 EC_{t-i-1} + u_t$$  \hspace{1cm} (6)$$

In the above system of equations, $u_t$ shows serially uncorrelated random error term (white noise error term). Where $\lambda_i$ shows the disequilibrium adjusted in the equation, $EC_{t-i-1}$ shows cointegrating vector(s). As the adjustment coefficient ($\lambda_i$) gauges the role of error term

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\(^6\) Introduction to modern time series analysis by GebhardKirchgassner, JurgenWolters
towards stability, it is important to have the knowledge of magnitude and statistical significance of the error correction terms.

In this case, all the variables in the system of equations that is represented by the VECM framework become stationary. Addition of the error correction term in the above system of equations is useful for the identification of the causal relationship among the co-integrated series. However, it is not possible to determine the direction of causality with the help of the co-integration technique.

This is one of the limitations of the cointegration technique that it just indicates the presence of a causal relationship. For this purpose, the use of VECM is a standard in empirical literature. It provides a platform that ensures the stability and the diagnostic tests in the system. In this regard, Ordinary Least Squares (OLS) provides the robust results which is also helpful in conducting the diagnostic tests.

This framework provides the information about short-run as well as long-run causality which is valuable for the inferential analysis. Following three ways are suitable to examine the direction of causality in VECM:

i) Lagged term(s) significance for all of the right hand side variables, with the help of t-test. It reveals short-run causal relationship (which is also known as impact multiplier). Causality runs from the right hand side variables to the dependent one.

ii) Error-correction term coefficient gauges the long-run causality, and its significance is measured with the help of t-test, in each equation.

iii) Wald test (F-test) is helpful to examine the mutual significance of all the error correction terms and also the lagged values of right hand side variables in each equation (Oh and Lee, 2004).

The present study makes the use of time series data covering the period 1972-2008. Different sources of data are consulted for data collection. Global Terrorism Database7 (GTD) is that primary source of data, which provides data on the number of terrorist incidents in a year. Second source in this regard is “Violence and Terrorism in South Asia: Chronology and Profiles 1971–2004”. Utmost care has been taken to collect the data set so that maximum possible details

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7 National Consortium for the Study of Terrorism and Responses of Terrorism.
for the terrorist incidents could be collected for the period under analysis. As both of these sources define the terrorism alike, it is convenient to use them collectively.

Remaining three variables are per capita Gross Domestic Product (GDP), political repression (PR) and Literacy Rate (LIT). Data for the per capita GDP and the literacy rate have been acquired from World Development Indicator (WDI). Freedom House (FH) method of political and civil liberties was consulted to acquire the data on Political repression. Each country and territory has been assigned some numerical value ranging 1-7 in the Freedom House method. In addition, both political and civil liberties are treated separately. If these numerical values are falling from top value (7) to the lower value, it indicates higher level of political and civil liberty in the country. The present study combines the rating of the political and civil liberties and uses their average values for the inferential investigation.\textsuperscript{8}

Descriptive statistics of the study data are as:

**Table 1**

Statistics Summary of Variables:

<table>
<thead>
<tr>
<th></th>
<th>GDP</th>
<th>INC</th>
<th>LIT</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>6.07</td>
<td>3.89</td>
<td>36.11</td>
<td>25.78</td>
</tr>
<tr>
<td>Median</td>
<td>6.14</td>
<td>4.04</td>
<td>35.38</td>
<td>25.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>6.48</td>
<td>6.33</td>
<td>57.00</td>
<td>34.45</td>
</tr>
<tr>
<td>Minimum</td>
<td>5.60</td>
<td>1.10</td>
<td>22.23</td>
<td>17.32</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.27</td>
<td>1.27</td>
<td>9.32</td>
<td>4.19</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.35</td>
<td>-0.24</td>
<td>0.41</td>
<td>-0.01</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>1.84</td>
<td>2.58</td>
<td>2.36</td>
<td>2.05</td>
</tr>
</tbody>
</table>

\textsuperscript{8} Combines rating of average civil and political rights provide each country some status of the political freedom and liberty. For this purpose, it makes three broad categories. It is as follows:

A country gains the status of a Free Nation (FN) if it falls within the range of 1-2.5, its status becomes Partly Free Nation (PFN) if its index falls with the range of 3-5, and finally the worst case is of Not A Free Nation (NFN) if its index moves in the range 5.5-7.
5. RESULTS AND DISCUSSION

We begin our empirical analysis by testing the variables for unit root. As discussed in the methodology sections, OLS estimates will be spurious if the variables with unit root are in level form. Subsequently, testing the variables for stationarity is the first and most important step in time series analysis. For this purpose we make use of Augmented Dickey-Fuller test\(^9\) and Phillips-Perron test\(^10\) in order to check the robustness of results. The results of both these tests are illustrated in Table 2. It can be seen from the table that all the variables are non-stationary at level and stationary at first difference. Since both the ADF and PP tests give similar results about stationarity of these variables, we can safely conclude that all the variables in this analysis are integrated of order one.

Table 2: Results of Unit Root Tests

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF</th>
<th>PP</th>
<th>Order of Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level</td>
<td>First difference</td>
<td>Level</td>
</tr>
<tr>
<td>(INC)</td>
<td>0.55</td>
<td>-8.84***</td>
<td>0.98</td>
</tr>
<tr>
<td>(GDP)</td>
<td>-1.21</td>
<td>-4.42***</td>
<td>-1.29</td>
</tr>
<tr>
<td>(LIT)</td>
<td>1.81</td>
<td>-4.43***</td>
<td>-1.31</td>
</tr>
<tr>
<td>(PR)</td>
<td>-2.07</td>
<td>-6.11***</td>
<td>-2.17</td>
</tr>
<tr>
<td>(PR2)</td>
<td>-2.08</td>
<td>-6.44***</td>
<td>-2.17</td>
</tr>
</tbody>
</table>

Note: The regressions in level include both intercept and trend whereas in first difference include intercept only. *** indicates rejection of null hypothesis of non-Stationarity of the variable at 1% level of significance.

The next step is to investigate the cointegration among the variables. Before we do that, it is important to select the appropriate lag length for the analysis for a better data generating process. There are various criteria for selection of lag length. The selection criteria are given in Table 3\(^11\). It is evident from the table that all the criteria agree on the lag length of one. Given that we are using annual data, this lag length seems appropriate\(^12\).

\(^9\) Dickey, D.A., Fuller, W.A., 1979
\(^10\) Philips, P.C.B., Perron, P., 1988
\(^11\) *Applied Econometric Time Series by Walter Enders
\(^12\) Present study used Eviews5 for finding the lag length of model.
Table 3: Lag Selection

<table>
<thead>
<tr>
<th>Lag</th>
<th>LogL</th>
<th>LR</th>
<th>FPE</th>
<th>AIC</th>
<th>SC</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-185.75</td>
<td>NA</td>
<td>0.05</td>
<td>11.22</td>
<td>11.44</td>
<td>11.29</td>
</tr>
<tr>
<td>1</td>
<td>-36.94</td>
<td>245.09*</td>
<td>0.00*</td>
<td>3.93*</td>
<td>5.28*</td>
<td>4.397*</td>
</tr>
<tr>
<td>2</td>
<td>-14.09</td>
<td>30.92</td>
<td>0.00</td>
<td>4.06</td>
<td>6.53</td>
<td>4.90</td>
</tr>
<tr>
<td>3</td>
<td>12.56</td>
<td>28.22</td>
<td>0.00</td>
<td>3.96</td>
<td>7.55</td>
<td>5.19</td>
</tr>
</tbody>
</table>

Note: * indicates lag order selected by the criterion. LR: sequential modified LR test statistic; FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion

After the selection of appropriate lag length, the investigation of cointegration among variables is required. This test is conducted under the null of no Cointegration against the alternative of at least one cointegrating relationships (see Table 4). The results of both Trace Statistics and Maximum Eigenvalue tests are presented in Table 4*. It is evident from the table that both tests confirm the presence of long-run relationship among these five variables. Consequently, one can conclude there is cointegration among variables under consideration. This outcome also allows us to find short-run and long-run estimates. This task is accomplished below.

Table 4: Results of Johansen Cointegration Test:

<table>
<thead>
<tr>
<th>Rank r</th>
<th>Trace Statistics</th>
<th>Maximum Eigenvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r_0 = 0$</td>
<td>76.752*</td>
<td>35.139*</td>
</tr>
<tr>
<td>$r_0 \leq 1$</td>
<td>41.618</td>
<td>17.489</td>
</tr>
<tr>
<td>$r_0 \leq 2$</td>
<td>24.128</td>
<td>12.998</td>
</tr>
<tr>
<td>$r_0 \leq 3$</td>
<td>11.129</td>
<td>7.693</td>
</tr>
<tr>
<td>$r_0 \leq 4$</td>
<td>3.436</td>
<td>3.436</td>
</tr>
</tbody>
</table>

Note: * indicates the rejection of null-hypothesis at 1% significance level.

To begin with, we first explain the long-run results that are given in Table 5. Interestingly, the coefficient of per capita GDP is statistically insignificant, although it has
negative sign. This insignificance of the economic variable suggests that economic conditions are not the drivers of terrorism in the long-run in Pakistan. This outcome may not look surprising if one looks at the conflict area in Pakistan. The prime areas where the terrorist attacks took place are the Federally Administered Tribal Areas (FATA) and the Khyber Pakthunkhwa province of Pakistan. This region shares border with Afghanistan which has long been a fighting zone. Whenever, there is a war in Afghanistan, its effects come to Pakistan no matter what the economic conditions of the country are. Due to cultural and religious similarities with Afghanistan, any alliance of the Government of Pakistan with the foreign invaders in Afghanistan results aggravates the local residents of this region. This is exactly what happened in the War on Terror that started in 2001. The alliance by the Pakistani government with United States and NATO against the Afghani Taliban (which consists mostly of Pushtoons) annoyed the residents in FATA. The people considered the US as invaders in Afghanistan and, therefore, symphonized with the Afghanis Taliban. They were also blamed for providing safe hideouts to these Taliban in the tribal areas. As a result, the army started operation against those who found hideouts in the FATA regions. This operation resulted in collateral damage including the killing of innocent women and children. This turned the people of tribal areas against the army and they started terrorist attacks in Pakistan. In the light of this discussion, it can be concluded that terrorism may result from ideological, religious or political differences and not because of economic conditions. Economic conditions may be responsible for criminal activities but not for terrorism.

**Table 5: Long-Run Estimates Based on Johansen Cointegration**

<table>
<thead>
<tr>
<th>Regressors</th>
<th>Coefficients</th>
<th>$t$-Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>$GDP$</td>
<td>-0.740</td>
<td>-0.416</td>
</tr>
<tr>
<td>$LIT$</td>
<td>0.098</td>
<td>1.687*</td>
</tr>
<tr>
<td>$PR$</td>
<td>-7.117</td>
<td>-5.388***</td>
</tr>
<tr>
<td>$PR^2$</td>
<td>0.672</td>
<td>4.909***</td>
</tr>
</tbody>
</table>

Note: *** and * show significance at 1% and 10% levels of significance respectively.

The coefficient of literacy rate has positive sign and is statistically significant. This positive sign indicate that literacy rate has positive impact on terrorism. This result needs to be
carefully interpreted as it may apparently seem surprising. The positive association of education with terrorism can be justified in two ways. Firstly, education provides awareness to people about the injustices done to them. When they do not find appropriate platform to discuss their grievances; they may turn violent. This is exactly what is happening in the Baluchistan province of Pakistan. The Baluch believe that they have not been given their proper rights and instead of listening to their grievances, army operation had been started against those who raised their voices. The second justification is that the terrorist organization demands educated people because they can easily move and operate in any environment. The educated person will easily adjust himself in changing environment and, therefore, will be able to conduct attacks even in those places where the illiterate terrorist may not reach. These two reasons provide enough justification for this outcome. In addition, this result is also in line with Nasir et al. (2011).

Table 5 also demonstrates the relationship between political repression and terrorism. It is apparent from the table that there is non-linear long-run relationship between these two variables. This relationship says that political repression initially reduces terrorism as strict observation on various groups does not allow them to move freely and try to convince other people towards their notion. However, a continuous deprivation of people from their political rights and civil liberties ultimately become a driver of terrorism. Once again, the situation of Baluchistan is an evidence of this result, where repression initially reduced terrorist attacks. However, unending repression left no choice with the angry youth of Baluchistan but to turn to violent means to make their province a separate country. To sum up the discussion, ceaseless repression is not an appropriate measure to curtail terrorism in the long-run and people should be given the permission to speak and protests peacefully for their rights.
Table 6: ECM Results based on Johansen Cointegration

<table>
<thead>
<tr>
<th>Regressors</th>
<th>Coefficients</th>
<th>t-Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta GDP(1)$</td>
<td>7.25</td>
<td>1.12</td>
</tr>
<tr>
<td>$\Delta LIT(1)$</td>
<td>0.14</td>
<td>1.15</td>
</tr>
<tr>
<td>$\Delta PR(1)$</td>
<td>3.11</td>
<td>2.00**</td>
</tr>
<tr>
<td>$\Delta PR2(1)$</td>
<td>-0.35</td>
<td>-2.22***</td>
</tr>
<tr>
<td>$\Delta intercept$</td>
<td>-0.20</td>
<td>-0.90</td>
</tr>
<tr>
<td>$ecm(-1)$</td>
<td>-0.59</td>
<td>2.92***</td>
</tr>
</tbody>
</table>

Diagnostic test statistics

<table>
<thead>
<tr>
<th>Tests</th>
<th>Tests-stats</th>
<th>$p$-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial correlation</td>
<td>0.20</td>
<td>0.81</td>
</tr>
<tr>
<td>Normality</td>
<td>0.53</td>
<td>0.76</td>
</tr>
<tr>
<td>Heteroskedasticity</td>
<td>0.57</td>
<td>0.84</td>
</tr>
<tr>
<td>Stability test</td>
<td>0.05</td>
<td>0.81</td>
</tr>
<tr>
<td>ARCH test</td>
<td>0.008</td>
<td>0.92</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.54</td>
<td></td>
</tr>
</tbody>
</table>

Note: ** and *** indicates significance of coefficients at 5% and 1% levels of significance.

Moving towards the short-run results given in Table 6, one can clearly observe that both per capita GDP and the literacy rate are statistically insignificant, suggesting the fact that both economic conditions and education are not responsible for generating violence in the country in the short-run. The insignificance of the per capita GDP is not surprising as it is also insignificant in the long-run. It shows that even in the short-run, economic conditions do not play any role in initiating violence in the country. Literacy rate, as opposed to the long-run results, is not an important determinant in the short-run. This result makes sense because awareness due to education does not come in with only few years of schooling. It takes time for one to become aware and realize about the injustices done to him. Hence, the relationship between education and terrorism exists only in the long-run and not in the short-run.
The relationship between terrorism and political repression is once again non-linear and statistically significant. However, in the short-run, this non-linear relationship is opposite to the one found in the long-run results. That is, in the short-run, terrorism initially increases with repression and after a certain level of repression; it starts to rise with further increase in repression. Hence, we can say that there is an inverted U-shaped relationship between the two variables. This is an interesting result and the policy makers should pay heed to it. As Nasir et al. (2012) rightly point out that the policy maker should be under the impression the oppression can reduce violence permanently, as in the long-run, unending repression backlashes and stimulate violence ultimately. The lower part of Table 6 presents all the diagnostic tests. These tests confirm the absence of autocorrelation and heteroskedasticity as well as the normality and appropriateness of the models. The CUSUM and CUSUM of Squares, illustrated in figures 1 and 2 substantiate the stability of the model. Both of these tests are used to test the stability of estimated model over time. If the curve lies within the dashed lines, it indicates that model is stable over time.
Figure 1: CUSUM Test

Figure 2: CUSUM of Squares
Now that we have discussed in detail the short-run and long-run dynamics of terrorism in Pakistan, it will be of interest that we should also look into the causality analysis of this phenomenon. As is discussed earlier, the existence of cointegration among the variable does not show the direction of causality. As a result, we now inspect the short-run and long-run causalities for the variables under consideration. Since the variables are cointegrated, the VECM is the appropriate methodology for causality analysis. The results of the causality tests are presented in Table 7. The table is divided into two major blocks. The first block provides the short-run causality analysis whereas the second block gives the long-run results.

We begin with discussion about short-run causality among the variables. As is obvious from the table, terrorist incidents are caused only by political repression and its square term in the short-run. This result also corroborates the short-run results in Table 6. Another interesting result is the causality running from terrorism and literacy rate to per capita GDP. The effect of terrorism on GDP confirms the claims by the Government of Pakistan that the War on Terror has cost the economy more than 70 billion dollars. These 70 billion dollars is only through damage to physical infrastructure in the country. Another channel through which terrorism may affect overall economy is by damaging human capital. The terrorist attacks during war on terror period have killed more than 35000 and a lot more have been injured severely, leaving them incapable for working and thus becoming a burden on the economy. Likewise, education also plays an important part in the overall economic performance of the country.

Surprisingly, literacy rate, political repression and its square term are not caused by any of the variables present in the system in the short-run. The reason for education not being caused by GDP is understandable. With a meager amount of only 2% of GDP for education, how can one expect the GDP to play a vital role in enhancing literacy rate in the country? So, even if the GDP increases, significant amount is not allocated for education in Pakistan. these results empowers one conclude that there are uni-directional causalities running from political repression and square of political repression to terrorism, uni-directional causalities running from terrorism and literacy rate to per capita GDP.

Turning now the long-run causality results, it is obvious from the second block of the table that if there is any deviation from the long-run equilibrium in the system, it is corrected only by the variable “terrorist attacks”. Subsequently, rest of the four variables appear to weakly exogenous. This also confirm the fact that if the system is disturbed by any of these four
variable, it corrected by counter-balancing variations by the “terrorist attacks” variable. Based on these results, one can deduce that terrorism is caused by literacy rate, political repression along with its square term, but the reverse causality is found absent.

Table 7: VECM Causality test Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>ΔINC</th>
<th>ΔGDP</th>
<th>ΔLIT</th>
<th>ΔPR</th>
<th>ΔPR²</th>
<th>ECT (t-stats)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔINC</td>
<td></td>
<td>2.55**</td>
<td></td>
<td>0.76</td>
<td>1.35</td>
<td>1.13</td>
</tr>
<tr>
<td>ΔGDP</td>
<td></td>
<td></td>
<td>1.93**</td>
<td></td>
<td>0.26</td>
<td>1.43</td>
</tr>
<tr>
<td>ΔLIT</td>
<td></td>
<td></td>
<td></td>
<td>0.08</td>
<td></td>
<td>0.24</td>
</tr>
<tr>
<td>ΔPR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.61</td>
<td>0.82</td>
</tr>
<tr>
<td>ΔPR²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.61</td>
</tr>
</tbody>
</table>

Note: ECT represents error correction term. ** and * denote significance at 5% and 10% levels of significance respectively.
6. Conclusion:

This study examines the relationship among the terrorist incidents, fluctuations in economic growth, and the role of literacy rate in a politically repressed setup in Pakistan. For this purpose, it makes the use of time series data over the period of 1972-2008. Augmented Dickey-Fuller test and Phillips-Perron test both specify that all the variables are stationary at first difference. Results of both Trace Statistics and Maximum Eigenvalue tests confirm the presence of long-run relationship among the five variables.

Results show that the coefficient of per capita GDP is statistically insignificant, with the negative sign. It indicates that economic conditions are not the drivers of terrorism in the long-run. The positive relationship of education with terrorism can be justified in two ways. Firstly, education delivers awareness in people about the injustices. If no appropriate platform is available for discussion on issues; it results in violence. In addition, terrorist organization demands higher educated people because the educated person will easily adjust in changing environment. In this case, they would be able to conduct attacks even in those places where the illiterate terrorist may not reach. Results show that there is a non-linear relationship between political repression and terrorism. Political repression initially might reduce terrorism, while a continuous deprivation of people from their political and civil liberties would raise the terrorism. People must have the freedom of speech and protest peacefully to have a healthy social set-up.

Short-run results show that both, per capita GDP and the literacy rate, are statistically insignificant, which indicates that both economic conditions and education are not responsible for violence, in the short-run. The insignificance of the per capita GDP shows that economic conditions do not play any role in initiating violence in the country even in the short-run. Literacy rate is more an important determinant of terrorism in the short-run. The relationship between terrorism and political repression is also non-linear and statistically significant in the short-run. It shows that terrorism initially increases with repression and after a certain level of repression it starts to rise. In addition, diagnostic tests confirm the absence of autocorrelation and heteroskedasticity, and also assure the normality and appropriateness of the models. The CUSUM and CUSUM of Squares also guarantee stability of the model.

VECM initially reports the short-run causal relationships among the variables. it shows that terrorist incidents are caused only by political repression in the short-run. It also finds the causality running from terrorism and literacy rate to per capita GDP. The effect of terrorism on
GDP confirms that economy has to face the severe damage to physical and human capital. Literacy rate, political repression and its square term are not caused by any of the variables in the system in the short-run. As education has just 2% share in of GDP that is why GDP plays no role in enhancing literacy rate in Pakistan. In short, it can be concluded that there is uni-directional causalities running from political repression and square of political repression to terrorism, uni-directional causalities running from terrorism and literacy rate to per capita GDP. In addition, long-run causality results show that any deviation from the long-run equilibrium is corrected only by the variable “terrorist attacks”. So, it can be concluded that all the remaining variables are weakly exogenous.

The present study suggests the following policy implications based on its findings. GDP per capita functions as a proxy of military power of in the country. This is because it improves the ability of state to fight against the terrorism through counter insurgency. As a major part of our budget is allocated to military expenditures, so it is a relevant statement. Rather than fighting the terrorist groups in battle field, policy makers must focus on the primary causes that result in the militant insurgency. If the budget resources are directed from military use to the development sector, this evil of terrorism can be overcome more effectively. People are induces towards militancy because they lack the opportunities for their social appraisal. Finally, policy makers should not recommend the oppressive rules to overcome the insurgencies. People needed to be talked for the solution of the problems. If their problems are solved in a well manner way, there will be no more violence in the society.
References


Choudhry, A. M (2005). Pakistan: where and who are the world’s illiterates?, background paper “education for all global monitoring report 2006”


