An empirical investigation of causal linkages between domestic terrorism and macroeconomic variables: a case for Pakistan

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Abstract

While the root causes of terrorism are multidimensional – ranging from religious extremism to a sense of alienation from society to anger at perceived geopolitical injustice – economic factors can help explain the rise of terrorism. With the help of the ARDL bounds testing approach followed by variance decomposition (VDC) and impulse response (IR) function, this study provides an empirical investigation to determine the causal relationship of the variables of economic growth, trade, military spending, education spending and unemployment on the onslaught of terrorism in Pakistan. The results of the overall study clearly conform to the deprivation and modernization hypotheses that underdevelopment and poverty do provide fertile grounds to terrorists for new recruits while unequal growth could equally facilitate the spread of terrorism. According to our analysis, in the short run, terrorism is most affected by the variables of trade and GDP. However, in the long-run, two startling outcomes are the positive and significant relationships between GDP growth and terrorism, and also between military spending and terrorism which imply that increased economic growth and military spending breed terrorism. The first relationship can be explained on the basis of rising income inequality and modernization hypothesis. The second linkage can be the aftermath of government's asymmetric military spending at the expense of critical development sectors like education which significantly reduce the opportunity cost of terrorism in the society as elicited by a significant long-run relationship between military spending and education. The overall result of the study has many significant policy implications including shifting the precedence of military spending and war on terror towards the more desirable socio-economic sectors of education, trade and employment.

Key words: *Terrorism, economic factors, ARDL bounds testing, Variance Decomposition (VDC), Impulse Response (IR) Function, Military Spending, Education Spending, Economic Growth.*

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Section 1: Introduction

Terrorism is often viewed in historical, sociological, psychological, political, or geopolitical terms alone but it can also have substantial economic repercussions. Catastrophic terrorist attacks such as 9/11 can impair business and consumer confidence, which hinders investment and consumption patterns and through it the relevant macroeconomic performance. Terrorist attacks that target vital infrastructure can seriously disrupt transportation and communication networks and thus could cripple the entire economy. Indeed, some terrorist attacks are specifically designed to inflict economic damage upon the target country. In addition, the war on terrorism can have a substantial economic effect on both the country waging the war – such as the US – and the home country—such as Afghanistan – or on proxy states like Pakistan. For the US, the massive military spending incurred during the war has significant implications for its fiscal health. For Afghanistan, a low income country with limited resources, the military spending of the US and its coalition partners was, in effect, a huge boost in foreign aid, with a correspondingly outsized impact on economic growth. Terrorism not only has economic consequences, but also economic causes. There is a multitude of situations capable of provoking terrorism. Discussions about the *causes and consequences* of terrorism are bound to be controversial. To many people, any focus on underlying causes, motivating factors, and grievances, implies a kind of justification for violence. While such objections may in some cases be plausible but any academic study focusing on the origins and repercussions of terrorism must objectively rely upon causalities and dispassionately explore all significant factors leading to changes in its occurrence and manifestation. Furthermore, in the post 9/11 era, it is more important than ever that one seeks to understand the driving forces and motivations behind terrorism; otherwise it will be impossible to devise balanced and effective long-term counter-measures.

Some argue that poverty, unemployment, trade and many other economic factors have little explanatory power on the onset of terrorism. Others argue that terrorist attacks can have significant negative effects on economic performance but measuring this impact with any degree of certainty is inherently challenging. There is a wide range of factors which may give rise to terrorism, economic factors are generally believed to play a crucial role. The long term indirect costs of terrorism can be 10 to 20 times larger than the direct costs (Institute for Economics and Peace, 2015). With the threat of terrorism, normal business requires more time and extra security. Thus, terrorism leads to a general slowdown and friction in economic activity. Modernization, based on free trade and an open economy, will foster a high level of economic development, which in itself lowers the potential for violent conflict. A prosperous, developed economy will also lay the ground for democratic rule, which again, together with a high level of economic development, has a stabilizing effect on internal affairs and ultimately promotes domestic peace. It also promotes international peace as democracies very rarely fight other democracies. In short, the liberal school's view is that modernization leads to prosperity, which in turn, reduces the chances of violent conflict, either directly or via political reform and democratization.

While the root causes of terrorism are multidimensional – ranging from religious extremism to a sense of alienation from society to anger at perceived geopolitical injustice – economic factors can help explain the rise of terrorism. Economic stagnation can limit employment and other economic opportunities for the youth. Lack of economic opportunities can be a powerful driver of terrorism, especially in conjunction with other problematic social and political factors. This problem is especially pronounced in countries with relatively young populations and large numbers of young people. A large and growing army of young people mired in hopelessness and despair about the future provide fertile recruiting grounds for terrorist organizations. Terrorists may be deprived and uneducated people or affluent and well educated. There exist few, if any,

comprehensive reviews of academic works explaining why some countries experience more terrorism than others. This is evidently a knowledge gap that needs to be addressed. The societal or national level is considered the most useful level of analysis with regards to any attempts at forecasting and long-term prediction about domestic terrorism trends.

A significant proportion of terrorist activities is limited to very few geographical pockets across the globe which are typically characterized by poverty and poor economic progress. The majority of deaths from terrorism do not occur in the West. Excluding the September 11 attack, only 0.5 per cent of deaths from terrorism have occurred in the West since 2000. Including September 11, the percentage reaches 2.6. Since 2000 there has been over a five-fold increase in the number of deaths from terrorism, rising from 3,361 in 2000 to 17,958 in 2013 and over 80 per cent of the lives lost to terrorist activity in 2013 occurred in only five countries - Iraq, Afghanistan, Pakistan, Nigeria and Syria - and Pakistan is on rank three according to Global Terrorism Index Report 2013 (See figure 1)

The burden on a state actively fighting terrorism may be enormous, serious and at times unmanageable, with severe consequences on the country's economic outlook. Pakistan's economic growth (as measured by GDP) came to a near halt at around 2 per cent in the fiscal year 2009, not alone of the global financial crisis, but primarily because of internal security issues. These included military operations aimed at terrorists launched by Pakistan Army in the northern province of Khyber Pakhtunkhwa and the Federally Administrated Tribal Areas (FATA) bordering Afghanistan which lead to a mass exodus of some three million people local population to other areas of Pakistan in search of a sanctuary – turning it into an unprecedented social crisis.

Figure 1: Summary of statistics about terrorism in Pakistan

(Source: The Global Terrorism Index 2013, published by the Institute for Economics and Peace)

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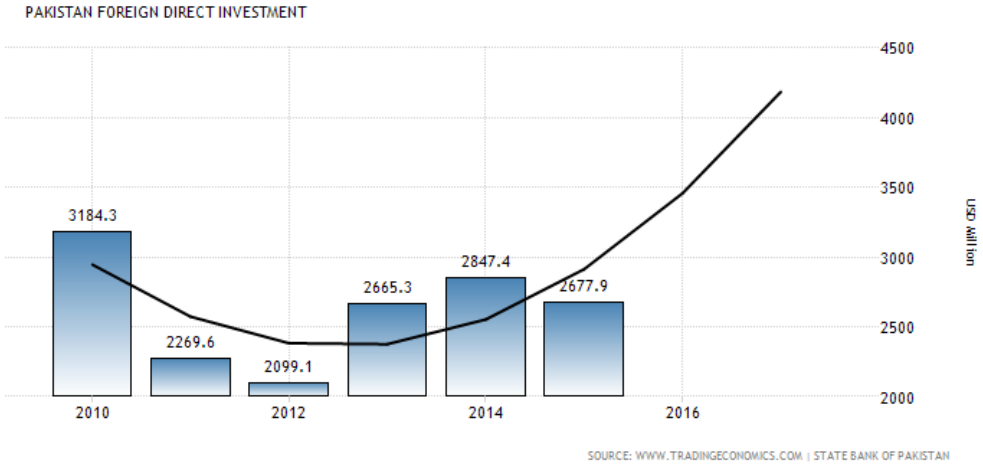
Figure 2: Summary statistics of Pakistan foreign direct investment



Academic literature focusing on the causes and development of terrorism has mainly dealt with the effects of political and institutional factors on terrorism (Gassebner & Luechinger, 2011; Krieger & Meierrieks, 2011). These mostly transnational studies have shown that political and institutional factors have historically played a more important and influential role in the growth of terrorism than that of economic factors. Although, previous studies resorted to taking a more transnational approach but this study opts for a country-specific approach by focusing specifically on Pakistan. (Sánchez-Cuenca & De la Calle, 2009) conclude that studies focusing on transnational terrorism may bring about incorrect assumptions pertaining domestic or country-specific acts of terrorism. Therefore probing the economic determinants of growth and development of terrorism in Pakistan should essentially be approached through a country-specific model to yield better understanding instead of the traditional transnational approach as seen in (Gassebner & Luechinger, 2011; Krieger & Meierrieks, 2011; Piazza, 2006).

There has been a visible dearth of literature discussing the economics of terrorism in developing countries like Pakistan. Moreover, previous studies haven't rigorously discussed the trade-off between acquisition of 'hard power' vs socio-economic development as a determinant of growth of terrorism in a country. Asymmetries in military expenditure and development initiatives by a state are often followed by dismal

[3] National Consortium for the Study of Terrorism and Responses to Terrorism (START). (2015). Global Terrorism Database [Data file]. Retrieved from http://www.start.umd.edu/gtd

socio-economic conditions which provide fertile ground for terrorism. This is especially relevant for Pakistan, which has been consistently criticised for its nuclear program development at the cost of its socio-economic infrastructure. It is thus imperative for any meaningful study on terrorism in Pakistan to probe, in addition to the effect of economic growth, the effect of the 'hard power' vs socio-economic development choice made by a state as reflected by its military expenditure on one side and its development indicators like education expenditure, unemployment rate and trade as percentage of GDP on the other side. Therefore, the main objective of this paper is to determine the causal relationship of the variables of economic progress, military expenditure, education expenditure, unemployment rate and trade on the onslaught of terrorism in a country. Moreover, the study also seeks to establish the relative endogeneity and exogeneity of these variables to make the analysis useful and relevant for drawing policy implications i.e. what variables actually need to be influenced to achieve the desired counter-terrorism results. Relevant literature has usually taken the number of terrorism incidents in a year as proxy for terrorism in a country but for the first time for Pakistan this study would be taking number of terrorism related fatalities and injuries as proxy for terrorism, which is more representative of the extent of damage done by terrorists relative to mere number of incidents. With the help of the ARDL bounds testing approach followed by variance decomposition (VDC) and impulse response (IR) analyses, this study provides empirical investigation the economic causes of terrorism in Pakistan and suggests certain effective counterterrorism policies.

The results of the overall study clearly conform our deprivation and modernization hypotheses that underdevelopment and poverty do provide fertile grounds to terrorists for new recruits. A surprising outcome of our results is a positive and significant relationship between military spending and terrorism. According to our analysis in the short run terrorism is most effected by the trade and GDP growth and in the long run Terrorism elicits a significant relationship with military spending and education which has significant policy implications. The study also reveals the fact that military spending is the only exogenous variable that can be used as a policy instrument with a balancing approach as military spending has the most significant influence on the education spending which in turn is directly linked with unemployment, GDP growth and trade and therefore leads towards terrorism. Our analysis should give policymakers at least some rough clues about what is at stake economically in the event of a terrorist attack.

The next section will discuss the historical narrative of the onslaught of terrorism in Pakistan to set the context straight. The third section covers the review of literature while the fourth section explains the data and methodology used. The fifth section then presents the empirical results and discussion while suggesting policy implications based on empirical results obtained in section 4. Conclusions and avenues for future research are discussed in Section 6.

Section 2: An overview of terrorism in Pakistan:

Pakistan has throughout been a victim of its geopolitical situation and geostrategic location. On one side, there is the long running Kashmir dispute with India and on the other side, the porous border with Afghanistan is not secure and is prone to infiltration by Islamic militants such as the Taliban. Although, Pakistan has been suffering from the terrorism problem ever since its creation in 1947 but historically there are five defining events or factors that triggered or accelerated the growth of organized terrorism in Pakistan.

The first of these was the rise to power of General Zia-Ul-Haq, a military dictator who arrested the then elected Prime Minster Mr. Zulfiqur Ali Bhutto and subsequently executed him in 1979. As a result of Bhutto's execution, a terrorist group called Al-Zulfikar emerged to seek revenge. To counter Al-Zulfikar, General Zia created and nurtured a new political group called Muhajir Qaumi Movement (MQM), which banked on the politics of ethnicity. In its heyday, MQM may have been responsible for 90% of terrorist incidents in the cities of Karachi and Hyderabad, and 40% in the rest of the country (Fair, 2004).

The second wave of terrorism was generated in the aftermath of the Iranian revolution of 1979. Before 1980s, religion was not considered a major fissure in Pakistani society but the Shia-Sunni sectarian divide intensified ever since the Iranian revolution, which gave rise to the phenomenon of religious terrorism and extremism in Pakistan.

Third and probably the most significant event was the Soviet invasion of Afghanistan in 1979, due to which, US funded Islamic militants from different regions of the world came to Pakistan to move across the border to fight against the Russian occupation. Those militants subsequently became the foundation of terrorism in Pakistan, especially in the northern part of the country. In fact, they became the epicenter of global terrorism for decades to come (Weiner, 1998).

The fourth wave ensued from the defeat of the Soviet Union in Afghanistan as the political control of Afghanistan fell into the hands of Taliban. The Americans formerly supported Islamic militants in the northern part of Pakistan and Afghanistan during the fight against Soviet occupation while some of these militants, in the likes of Osama Bin Laden, went on to become some of the most feared terrorists in the world.

The fifth event was the game-changing 9/11 terrorist attacks in the US. The attacks elevated global terrorism to an entirely different level and provoked US-led military strikes against Afghanistan and the fall of the Taliban regime there. Pakistan provided crucial logistic support to US in its offensive against the Taliban in Afghanistan. One by-product of the US invasion of Afghanistan was the spillover of Islamic militancy and terrorism to the bordering areas of Pakistan as the militants fled to Pakistan to avoid US strikes, made possible by a porous border between the two countries.

Pakistan has suffered a lot due to terrorism in terms of both security and economy, enduring more than 56,000 deaths and more than 40,000 injuries. Additionally, large scores of people have been internally displaced and forced to migrate to other parts of the country. Terrorism destroyed a lot of infrastructure, worsened the investment climate, affected production, and increased unemployment. Due to heightened risk and uncertainty, domestic and foreign investment stalled, and economic growth slowed down. During the last decade, the total cost of terrorism (direct & indirect) for Pakistan is estimated to be around in excess of US $ 103 billon which is equivalent to Rs.8260 billion (Estrada et al., 2015). Government of Pakistan has been actively fighting terrorism for the past decade, via Pakistan Army and supported by U.S. military forces (logistics and financial support). In particular, the massacre of 148 innocent school children in a public school of Peshawar in December 2014 was a structural break in the government's attitude and policies on terrorism issues. This act of brutality lead to the development of a comprehensive 'national action plan' (NAP) by the Government to eradicate terrorism (Javaid, 2015).

Section 3: Review of literature

There has been extensive literature pertaining to terrorism, most of which is written after 1968. However, much of this work either falls into the trap of being ideologically biased while being purely psychological and speculative, or is built on data of dubious quality. Furthermore, bulk of this research deals with conceptual or definitional problems, and only limited effort is put into systematic, empirical work. Thus, most of the existing literature suffers from a general lack of good empirically grounded research on the patterns and causes of terrorism. However, over the past few years, there has been some progress in terrorism research testing hypotheses about the causes of terrorism and new research has demonstrated causal relationships between prevalent socio-economic and political conditions and incidence of terrorism (Silke, 2004).

There are two major schools of thought on the economic explanations of roots of terrorism. The first and most popular school holds that it is poor economic conditions and lack of economic growth that favors the emergence of terrorism and political violence. They argue that poverty and income inequality would feed frustration, hatred and grievance which makes political violence and hence terrorism more likely. In the presence of widespread poverty, the opportunity cost for individuals of joining terrorist ranks is very low and this favors the recruitment process undertaken by terrorist organizations. This point (which is based on the

classical opportunity-cost argument) is commonly known as economic deprivation hypothesis. The second school holds that even an unequal stream of economic growth can fuel the grievances of some groups in the society owing to economic disparity, which would increase the propensity for violence and through it of terrorism. This is known as the modernization hypothesis and the basic intuition of this argument is that socio-economic changes over long-run affect socio-economic conditions. In this view, terrorist organizations would flourish if they are able to collect and capitalize on the grievances of losers. Therefore, terrorism and political violence would emerge in the presence of economic growth and development. It might seem counter-intuitive that economic growth may fuel terrorism but studies performed by (Lai & Thyne, 2007), (Freytag & Thurik, 2010), (Caruso & Schneider, 2011)and (Ismail & Amjad, 2014) revealed results in conformity with the modernization hypothesis.

As for its impact on domestic or intra-state terrorism, (Engene, 1998) finds that rapid economic modernization, measured in growth in real GDP[4], has a strong, significant impact on levels of ideological terrorism in Western Europe. However, relevant literature does not provide a conclusive answer on any bidirectional causal linkage between terrorism and economic growth. In hindsight, an increase in economic growth rate should lead to a decline in terrorism by increasing the opportunity costs of engaging in terrorist activities (deprivation argument). However, on the other hand, if the benefits of economic growth are not widespread and there is an unequal distribution of wealth, geographically or otherwise, it may cause domestic terrorism to rise (modernization argument). Alternatively, an increase in terrorist activities may lead to a decline in economic growth. It is also possible that causality exists from both sides or there may be no causality at all between economic growth and terrorism (Muhammad et al., 2011).

One of the most robust findings in quantitative peace research is that most violent conflicts occur within or between poor or underdeveloped countries, while hardly ever in rich developed states (Gleditsch, 2002). Also, cross-country studies surveying attitudes and norms, find that the level of wealth and economic development is highly significant in accounting for variations in support for political violence (MacCulloch, 2004). Using micro-data sets based on opinion polls and value/attitude surveys from more than 60 countries from 1975-1995, (MacCulloch, 2004) finds that popular support for revolutions varies greatly with general income level of the people and a rise in GDP significantly reduces the chances of supporting a revolt[5]. A more direct explanation of how poverty promotes violence is the so-called 'predation theory' by (Collier & Hoeffler, 2004). They argue that in any society there will always be greed-motivated conflict entrepreneurs willing to take up arms against a government as long as it is financially viable to do so. In societies where the level of welfare is high, the costs of participating in insurrections are much higher than in poor societies, higher economic incentives are needed, and hence, growing welfare radically reduces the economic viability of an armed revolt. Conversely, where poverty is extreme and widespread, little economic incentive is needed to motivate young people to risk their lives as guerrillas, if only for the monetary compensations involved (Collier & Hoeffler, 2004).

After the 9/11 incident, the debate about whether poverty facilitates terrorism has gained considerable momentum (Krueger & Malečková, 2003). (Eckstein & Tsiddon, 2004; Frey et al., 2007; Mirza & Verdier, 2008; Sandler & Enders, 2008) have discussed the theoretical framework regarding channels through which terrorism impedes economic growth. The potential costs of terrorism borne by an economy, in terms of hampered economic growth, can be classified as direct and indirect costs. (Collier, 1999) identified the most obvious and direct perils of civil wars, of which terrorism can be considered a related phenomenon, as destruction of physical capital including the destruction of public infrastructure and the loss of human capital.

[4] Economic growth in real GDP is frequently used as an indicator of economic modernisation in research on conflict and violence.

[5] MacCulloch (2204) has used The European Commission's *Euro-Barometer Survey Series* for 1976-1990 and *The Combined World Values Survey* for 1981, 1990, 1995, produced by the Institute for Social Research, Ann Arbor, MI, USA.

Simultaneously, transaction costs are amplified as a result of the reduced security and the effectiveness of government institutions is compromised. A key factor affecting economic growth and through it the incidence of terrorism is the share of GDP directed toward development spending by the state, which boils down to the 'hard power' vs development tradeoff mentioned earlier. (Blomberg et al., 2004; Gaibulloev & Sandler, 2008) highlight that terrorism diverges economic activities away from development spending to non-productive defense spending to counter and deter terrorist activities. (Knight et al., 1996) quantified the impact of military spending on gross domestic product (GDP) and showed that an additional 2.2% of GDP spent on the military, sustained over seven years (the length of a typical conflict) would lead to a permanent loss of around 2% of GDP.

(Abadie & Gardeazabal, 2008) showed that significant reductions exist in net foreign investment flows into a country due to terrorist risk. (Enders & Sandler, 1996) investigated the impact of terrorism on the net foreign direct investment (NFDI) in Spain and Greece using VAR analysis. They found that terrorism reduced foreign direct investment flows by 13.5% and 11.9% in these countries respectively as investors sought out less violence-prone countries; however the impact is expected to be smaller for larger diversified economies. In addition, (Coe & Helpman, 1995) identified that foreign direct investment (FDI) plays a vital role in technology transfer which enhances total factor productivity leading away the economy away from violent tendencies. Moreover, terrorism can adversely disrupt financial markets, thereby decreasing investment flows (Abadie & Gardeazabal, 2003).

A quantitative cross-country study by (Li & Schaub, 2004) reveals that economic development in a country and among its major trading partners reduces the likelihood of transnational terrorism. They conclude that the effect of economic development in reducing transnational terrorism is significant and recommend that: 'promoting economic development and reducing poverty should be an important component in the global war against terrorism'. (Abadie & Gardeazabal, 2003; Chen & Siems, 2004; Gaibulloev & Sandler, 2008; Sandler & Enders, 2008) have shown that economic growth is negatively affected by terrorism albeit to different levels in different economies. (Mirza & Verdier, 2008; Nitsch & Schumacher, 2004) have also documented the negative impact of terrorism in a country on its bilateral international trade. According to their study Pakistan faces a humongous loss of revenue that could have had otherwise been generated from serving as a trade route between India, China, Iran and other Central Asian states which is currently not possible due to massive terrorist activities in the bordering areas of Pakistan.

(Ismail & Amjad, 2014) examined the determinants of terrorism in Pakistan. They used time series data of terrorist incidents as proxy for terrorism for the period 1972 to 2011. The other variables of the study are GDP per capita, political rights, literacy, inflation, unemployment, inflation, poverty, and inequality. They concluded long run relationships among the various economic and social variables with literacy, poverty, inflation, and GDP per capita standing out as the most important determinants of terrorism in Pakistan while political repression, unemployment, and inequality were found to be insignificant towards incidence of terrorism. (Hussain, 2003) studied causes and origin of terrorism in Pakistan from an economic history perspective and concluded illiteracy and poverty to be the prime determinants of terrorism and societal intolerance in Pakistan.

However, the recent Global Terrorism Index Report 2015[6] reveals that poverty and several other economic factors have little explanatory power on the onset of terrorism. This includes several broader development

[6] National Consortium for the Study of Terrorism and Responses to Terrorism (START). (2015). Global Terrorism Database [Data file]. Retrieved from http://www.start.umd.edu/gtd

factors such as mean years of schooling and life expectancy, etc. It highlights that weak political systems, a lack of political legitimacy and the presence of state-sponsored violence are more influential for explaining the rise of terrorist organizations than the broader economic environment. (Gassebner & Luechinger, 2011) also found that economic development had a minor effect on terrorist activities. (Piazza, 2006) evaluated the deprivation hypothesis that poverty, inequality, poor economic development, and unemployment are the prime causes of terrorism. However, the results did not indicate any causality between economic growth and terrorism. Instead the structure of party politics was found to be the most significant predictor of terrorism. Here it is important to note that most of these inferences of little or no economic rationale for terrorism are generally broad transnational models for different factors relating to terrorist activities. Similarly, (Derin-Güre, 2011) scrutinized the causes of separatist terrorism in South-Eastern parts of Turkey where government policies are geared toward improving economic conditions in pursuance of the widely accepted hypothesis that poverty is the main driving force behind separatist terrorism. However, there was no causal relationship found between economic development and separatist terrorism in South-Eastern Turkey. (Nasir et al., 2008) studied the direction of causal relationship between economic growth and terrorism in Pakistan and found no causality running either from economic growth to terrorism or from terrorism to economic growth.

The main proposition of this study is that terrorist activities cause poor economic performance when analyzed within the scope of domestic terrorism. The adverse effects of terrorism on economy can be best explained by the rational choice theory. A government under the threat of terrorist attacks has to fight terrorism on a rational basis. Government, thus, needs to spend on military at the cost of compromising the crucial sectors of economy like education, employment and trade etc. which is perceived to be less detrimental than giving into the demands of terrorists (Sandler & Enders, 2008). Thus, the motivation of this study is to extend the literature by making a Pakistan specific analysis of the economic variables of GDP per capita, military spending, education spending, unemployment, trade and terrorism to draw any long-run and short-run relationships amongst these variables.

Section 4: Data and Methodology

4.1: The Data

The data for terrorism is retrieved from the Global Terrorism Database (GTD), maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism (START). Defining terrorism is not a straight forward matter and there is no single internationally accepted definition of what constitutes terrorism, and literature on terrorism is abound with competing definitions and typologies. The GTI therefore defines terrorism as "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation." Domestic terrorism is indicated by the total number of individuals killed and wounded by the acts of domestic terrorism in a given year and added unity to allow for zero observations.[7]

We extract the data for all other economic variables from the World Development Indicators[8] database maintained by the World Bank. Economic growth is measured by the real GDP per capita. We transformed both the series of terrorism and GDP by taking the natural logarithm to better account for the outliers and to turn the series stationary in variance. Government expenditure on education as a percentage of GDP, military expenditure as a percentage of GDP, unemployment as a percentage of total labour force and trade (sum of

[7] We add unity to the observations in order to compute the natural logarithm also in those years when there were no victims from terrorist attacks. Note that by adequate data processing we circumvent potential problems associated with 'excess zeros' (i.e., when there are many observations without victims from terrorism).

[8] The World Bank. 2015. "World Development Indicators." URL: http://data.worldbank.org/data-catalog/world-development-indicators

imports and exports of goods and services in a year) as a percentage of GDP are the other economic variables considered in the study. The data used here are the yearly figures and covers a span of 45 years starting from 1970 to 2014.

4.2 The Methodology

The Autoregressive Distributed Lag Model or simply the ARDL bound testing approach to cointegration developed by (Pesaran et al., 2001) has been used to conduct cointegration analysis between terrorism, economic growth, education spending, military spending and total trade for the case of Pakistan. The ARDL bound testing approach to cointegration is preferred over traditional cointegration approaches due to its merits. For instance, the ARDL bounds testing can be applied regardless of whether the variables are integrated of order I(0) or integrated of order I(1). The ARDL bound testing approach to cointegration has better properties for small data sample. (Zhang & Yue, 2002) has shown that the ARDL approach to cointegration provides better results for a small sample data set as compared to traditional approaches such as the (Engle & Granger, 1987); the (Johansen & Juselius, 1990); and (Phillips & Hansen, 1990) methods. These approaches require that all the series should have unique order of integration. In addition, unrestricted error correction model (UECM) is derived from the ARDL model using simple linear specification (Banerjee & Newman, 1993), which integrates both long-run as well as short-run dynamics. The UECM model does not seem to lose information about long-run relation. Another advantage of the ARDL bound testing approach is that the unrestricted model of ECM accommodates lags that capture the data generating process in a general-to-specific framework (Laurenceson & Chai, 2003). This method is favored over the traditional regression method because the Regression only Approach only captures short term, cyclical or seasonal effects. In other words, the regression is not really testing long term (theoretical) relationships. Moreover, in traditional regression, the endogeneity and exogeneity of variables is pre-determined by the researcher, usually on the basis of prevailing or a priori theories. However, in case of terrorism and its related studies, we are dealing with a relatively nascent subject and there is a notable absence of established theories. Cointegration techniques are advantageous in that they do not presume variable endogeneity and exogeneity. In the final analysis, the data will determine which variables are in fact exogenous, and which are exogenous. In other words, with regression, causality is presumed whereas in cointegration, it is empirically proven with the data. Also, cointegration techniques embrace the dynamic interaction between variables whereas traditional regression methods, by definition, exclude or discriminate against interaction between variables.

The unrestricted error correction model (UECM) of the ARDL bound testing approach to cointegration version is as follows:

$$\begin{aligned}\Delta lnTERROR_t = {} & \alpha_0 + \alpha_T T + \alpha_{TR} \ln TERROR_{t-1} + \alpha_G lnGDPPC_{t-1} + \alpha_D lnTRADE_{t-1} + \alpha_E lnEDU_{t-1} \\ & + \alpha_M lnMILITARY_{t-1} + \alpha_{UN} lnUNEMP_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta \ln TERROR_{t-i} \\ & + \sum_{j=1}^{q} \alpha_j \Delta \ln GDPPC_{t-j} + \sum_{k=1}^{r} \alpha_k \Delta \ln TRADE_{t-k} + \sum_{l=1}^{s} \alpha_l \Delta \ln EDU_{t-l} \\ & + \sum_{m=1}^{t} \alpha_m \Delta \ln MILITARY_{t-m} + \sum_{n=1}^{w} \alpha_n \Delta \ln UNEMP_{t-n} \\ & + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.1\end{aligned}$$

$$\Delta lnGDPPC_t = \beta_0 + \beta_T T + \beta_{TR} \ln TERROR_{t-1} + \beta_G lnGDPPC_{t-1} + \beta_D lnTRADE_{t-1} + \beta_E lnEDU_{t-1} + \beta_M lnMILITARY_{t-1} + \beta_{UN} lnUNEMP_{t-1} + \sum_{i=1}^{p} \beta_i \Delta \ln TERROR_{t-i} + \sum_{j=1}^{q} \beta_j \Delta \ln GDPPC_{t-j} + \sum_{k=1}^{r} \beta_k \Delta \ln TRADE_{t-k} + \sum_{l=1}^{s} \beta_l \Delta \ln EDU_{t-l} + \sum_{m=1}^{t} \beta_m \Delta \ln MILITARY_{t-m} + \sum_{n=1}^{w} \beta_n \Delta \ln UNEMP_{t-n} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.2$$

$$\Delta lnTRADE_t = \theta_0 + \theta_T T + \theta_{TR} \ln TERROR_{t-1} + \theta_G lnGDPPC_{t-1} + \theta_D lnTRADE_{t-1} + \theta_E lnEDU_{t-1} + \theta_M lnMILITARY_{t-1} + \theta_{UN} lnUNEMP_{t-1} + \sum_{i=1}^{p} \theta_i \Delta \ln TERROR_{t-i} + \sum_{j=1}^{q} \theta_j \Delta \ln GDPPC_{t-j} + \sum_{k=1}^{r} \theta_k \Delta \ln TRADE_{t-k} + \sum_{l=1}^{s} \theta_l \Delta \ln EDU_{t-l} + \sum_{m=1}^{t} \theta_m \Delta \ln MILITARY_{t-m} + \sum_{n=1}^{w} \theta_n \Delta \ln UNEMP_{t-n} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.3$$

$$\Delta lnEDU_t = \gamma_0 + \gamma_T T + \gamma_{TR} \ln TERROR_{t-1} + \gamma_G lnGDPPC_{t-1} + \gamma_D lnTRADE_{t-1} + \gamma_E lnEDU_{t-1} + \gamma_M lnMILITARY_{t-1} + \gamma_{UN} lnUNEMP_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta \ln TERROR_{t-i} + \sum_{j=1}^{q} \gamma_j \Delta \ln GDPPC_{t-j} + \sum_{k=1}^{r} \gamma_k \Delta \ln TRADE_{t-k} + \sum_{l=1}^{s} \gamma_l \Delta \ln EDU_{t-l} + \sum_{m=1}^{t} \gamma_m \Delta \ln MILITARY_{t-m} + \sum_{n=1}^{w} \gamma_n \Delta \ln UNEMP_{t-n} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.4$$

$$\Delta lnMILITARY_t = \delta_0 + \delta_T T + \delta_{TR} \ln TERROR_{t-1} + \delta_G lnGDPPC_{t-1} + \delta_D lnTRADE_{t-1} + \delta lnEDU_{t-1} + \delta_M lnMILITARY_{t-1} + \delta_{UN} lnUNEMP_{t-1} + \sum_{i=1}^{p} \delta_i \Delta \ln TERROR_{t-i} + \sum_{j=1}^{q} \delta_j \Delta \ln GDPPC_{t-j} + \sum_{k=1}^{r} \delta_k \Delta \ln TRADE_{t-k} + \sum_{l=1}^{s} \delta_l \Delta \ln EDU_{t-l} + \sum_{m=1}^{t} \delta_m \Delta \ln MILITARY_{t-m} + \sum_{n=1}^{w} \delta_n \Delta \ln UNEMP_{t-n} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.5$$

$$\Delta lnUNEMP_t = \omega_0 + \omega_T T + \omega_{TR} \ln TERROR_{t-1} + \omega_G lnGDPPC_{t-1} + \omega_D lnTRADE_{t-1} + \omega lnEDU_{t-1} + \omega_M lnMILITARY_{t-1} + \omega_{UN} lnUNEMP_{t-1} + \sum_{i=1}^{p} \omega_i \Delta \ln TERROR_{t-i} + \sum_{j=1}^{q} \omega_j \Delta \ln GDPPC_{t-j} + \sum_{k=1}^{r} \omega_k \Delta \ln TRADE_{t-k} + \sum_{l=1}^{s} \omega_l \Delta \ln EDU_{t-l} + \sum_{m=1}^{t} \omega_m \Delta \ln MILITARY_{t-m} + \sum_{n=1}^{w} \omega_n \Delta \ln UNEMP_{t-n} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.6$$

Where T is the trend variable, GDP per capita is the proxy for economic growth represented by GDPPC, TERROR is a proxy for number of fatalities and injured representing terrorism, TRADE represents the trade as a percentage of GDP, EDU represents the education spending as a percentage of GDP, Military is a proxy for military expenditures as a percentage of GDP and UNEMP is the proxy for unemployment as percentage of total labor force.

In order to ensure that serial correlation does not exist, both the Akaike Information (AIC) and the Schwarz Bayesian (BIC) Criteria are used to select the optimal lag structure of first differenced regression. (Pesaran et al., 2001) determined the upper and lower critical bounds to conclude that either cointegration for long-run relationship exists or not among the running variables. The test has null hypotheses of no cointegration. The calculated F-statistics have been compared with the lower critical bound (LCB) and upper critical bound (UCB) computed by Pesaran et al. (2001), generated by the system automatically to test cointegration as follows:

$$F\text{-}statistic > UCB \Rightarrow cointegration\ exists;$$
$$F\text{-}statistic < LCB \Rightarrow no\ cointegration\ exists;$$
$$LCB < F\text{-}statistics < UCB \Rightarrow inconclusive\ results.$$

The direction of causal relationship between terrorism, economic growth and other macroeconomic variables in the study has been determined by means of a standard pair-wise Granger causality test. According to Granger representation theorem if the variables are integrated of order I(1) and cointegration exists among the variables then at least unidirectional Granger causality should exist.

The ARDL analysis also estimates the coefficients of the long-run relations and makes inferences about their values. It must be highlighted though that it is only appropriate to embark on this stage if we are satisfied that the long-run relationship between the variables to be estimated is not in fact spurious. (Engle & Granger, 1987) further elaborated that Granger causality can produce misleading results if cointegrated variables are tested at first difference through ARDL. However, the addition of another variable, error-correction term can help to capture the long-run relationships. Therefore, an error-correction term is included in the augmented version of Granger causality test and the result is a bivariate p^{th} order error-correction model (ECM) which is as follows:

$$\Delta lnTERROR_t = \alpha_{01} + \sum_{i=1}^{p} \alpha_{11} \Delta \ln TERROR_{t-i} + \sum_{j=1}^{q} \alpha_{12} \Delta \ln GDPPC_{t-j} + \sum_{k=1}^{r} \alpha_{13} \Delta \ln TRADE_{t-k} + \sum_{l=1}^{s} \alpha_{14} \Delta \ln EDU_{t-l} + \sum_{m=1}^{t} \alpha_{15} \Delta \ln MILITARY_{t-m} + \sum_{n=1}^{w} \alpha_{16} \Delta \ln UNEMP_{t-n} + \eta_1 ECM_{t-1} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.7$$

$$\Delta lnGDPPC_t = \beta_{01} + \sum_{i=1}^{p} \beta_{21} \Delta \ln TERROR_{t-i} + \sum_{j=1}^{q} \beta_{22} \Delta \ln GDPPC_{t-j} + \sum_{k=1}^{r} \beta_{23} \Delta \ln TRADE_{t-k} + \sum_{l=1}^{s} \beta_{24} \Delta \ln EDU_{t-l} + \sum_{m=1}^{t} \beta_{25} \Delta \ln MILITARY_{t-m} + \sum_{n=1}^{w} \beta_{26} \Delta \ln UNEMP_{t-n} + \eta_2 ECM_{t-1} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.8$$

$$\Delta lnTRADE_t = \theta_{01} + \sum_{i=1}^{p} \theta_{31} \Delta \ln TERROR_{t-i} + \sum_{j=1}^{q} \theta_{32} \Delta \ln GDPPC_{t-j} + \sum_{k=1}^{r} \theta_{33} \Delta \ln TRADE_{t-k} + \sum_{l=1}^{s} \theta_{34} \Delta \ln EDU_{t-l} + \sum_{m=1}^{t} \theta_{35} \Delta \ln MILITARY_{t-m} + \sum_{n=1}^{w} \theta_{36} \Delta \ln UNEMP_{t-n} + \eta_3 ECM_{t-1} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.9$$

$$\Delta lnEDU_t = \gamma_0 + \sum_{i=1}^{p} \gamma_{41} \Delta \ln TERROR_{t-i} + \sum_{j=1}^{q} \gamma_{42} \Delta \ln GDPPC_{t-j} + \sum_{k=1}^{r} \gamma_{43} \Delta \ln TRADE_{t-k} + \sum_{l=1}^{s} \gamma_{44} \Delta \ln EDU_{t-l} + \sum_{m=1}^{t} \gamma_{45} \Delta \ln MILITARY_{t-m} + \sum_{n=1}^{w} \gamma_{46} \Delta \ln UNEMP_{t-n} + \eta_4 ECM_{t-1} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.10$$

$$\Delta lnMILITARY_t = \delta_0 + \sum_{i=1}^{p} \delta_{51} \Delta \ln TERROR_{t-i} + \sum_{j=1}^{q} \delta_{52} \Delta \ln GDPPC_{t-j} + \sum_{k=1}^{r} \delta_{53} \Delta \ln TRADE_{t-k} + \sum_{l=1}^{s} \delta_{54} \Delta \ln EDU_{t-l} + \sum_{m=1}^{t} \delta_{55} \Delta \ln MILITARY_{t-m} + \sum_{n=1}^{w} \delta_{56} \Delta \ln UNEMP_{t-n} + \eta_5 ECM_{t-1} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.11$$

$$\Delta lnUNEMP_t = \omega_0 + \sum_{i=1}^{p} \omega_{61} \Delta \ln TERROR_{t-i} + \sum_{j=1}^{q} \omega_{62} \Delta \ln GDPPC_{t-j} + \sum_{k=1}^{r} \omega_{63} \Delta \ln TRADE_{t-k} + \sum_{l=1}^{s} \omega_{64} \Delta \ln EDU_{t-l} + \sum_{m=1}^{t} \omega_{65} \Delta \ln MILITARY_{t-m} + \sum_{n=1}^{w} \omega_{66} \Delta \ln UNEMP_{t-n} + \eta_6 ECM_{t-1} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.12$$

Where the difference operator is indicated by Δ; lagged residual term generated from long-run equation is indicated by ECM_{t-1} and μ is error term assumed to be normally distributed with zero mean and a finite covariance matrix. The existence of a short-run causal relation is indicated by the significance of t-values of first differenced variables and the significance of t-values relating to error-correction term confirms a long-run causal relationship.

However, the main limitation of ARDL tests is the inability to indicate how much feedback has existed from one variable to another. To examine the feedback from one variable to another and to check the relative effectiveness of causality effects ahead of sample period, we have applied variance decomposition and impulse response function to examine the direction of causality amongst terrorism, economic growth, trade, education spending, military spending and unemployment.

Section 5: Empirical results & discussion

5.1 Descriptive statistics and correlation matrix

Table 1 details the descriptive statistics and correlation matrix. The correlation analysis indicates a negative correlation between terrorism and the variables of military expenditure and trade whereas a positive correlation is found between terrorism and the variables of GDP growth and education, which seems counter intuitive and needs further investigation.

Table 1: Summary results of descriptive statistics and correlation matrix

	LTERROR	LGDPPC	LTRADE	LEDU	LMILITARY	LUNEMP
Observations	45	45	45	45	45	45
Mean	5.034433	10.53755	0.718058	2.281744	5.416282	4.486667
Median	6.059100	10.61400	0.357200	2.221800	5.621200	4.300000
Maximum	9.064500	10.96640	3.263100	3.022300	8.700000	7.800000
Minimum	0.000000	10.06090	0.022700	1.578300	3.265200	0.000000
Std. Dev.	2.854146	0.283503	0.868894	0.367590	1.451157	1.821288
Skewness	-0.515488	-0.247555	1.494623	0.036188	0.022848	0.030748
Kurtosis	1.965765	1.817673	4.215444	2.144607	1.904379	2.378285
Jarque-Bera	3.998535	3.080684	19.52418	1.381755	2.254637	0.731834
Probability	0.135434	0.214308	0.000058	0.501136	0.323901	0.693560

	LEDU	LGDPPC	LMILITARY	LTERROR	LTRADE	LUNEMP
LEDU	1.000000					
LGDPPC	0.470290	1.000000				
LMILITARY	0.057729	-0.589919	1.000000			
LTERROR	0.570648	0.935379	-0.451454	1.000000		
LTRADE	-0.582171	-0.889717	0.398942	-0.865621	1.000000	
LUNEMP	0.183064	0.638400	-0.436474	0.549466	-0.640555	1.000000

5.2 Tests for Stationarity

We begin our empirical testing by determining the stationarity of the variables used[9]. In order to proceed with the testing of ARDL cointegration later, ideally, our variables should be I(1), such that in their original level form, they are non-stationary and in their first differenced form, they are stationary. In the case where variables are integrated at I(2), calculated F-statistic cannot be used to determine the long-run relationship. The differenced form for each variable used is created by taking the difference of their log forms except when the variables are already in percentages as described in data and methodology section (Section 3). We then conducted the Augmented Dickey-Fuller (ADF) and PP tests on each variable (in both level and differenced form) [10]. Table 2 and 3 below summarize the results[11].

Table 2: Summary statistics for ADF test for unit root

AT LEVEL					
LEVEL	VARIABLE	ADF	VALUE	T-STAT.	C.V.	RESULT

[9] A variable is stationary when its mean, variance and covariance are constant over time.

[10] We tested for stationarity using the KPSS criteria as well and all variables to be I(0). See Appendix 3C for detailed results.

[11] See Appendix 1A to 1P for details.

LTERROR	ADF(2)=AIC	-57.7561	-2.1505	-3.4399	Non-Stationary
	ADF(2)=SBC	-61.9150	-2.1505	-3.4399	Non-Stationary
LGDPPC	ADF(3)=AIC	100.3106	-2.2125	-3.5818	Non-Stationary
	ADF(1)=SBC	97.7608	-1.9704	-3.4873	Non-Stationary
LTRADE	ADF(5)=AIC	-58.1536	-4.7454	-3.6057	Stationary
	ADF(5)=SBC	-51.4993	-4.7454	-3.6057	Stationary
LEDU	ADF(2)=AIC	-1.4528	-3.2454	-3.4399	Non-Stationary
	ADF(2)=SBC	-2.7061	-3.2454	-3.4399	Non-Stationary
LMILITARY	ADF(5)=AIC	-19.4649	-1.4153	-3.6057	Non-Stationary
	ADF(1)=SBC	-25.7183	-1.7441	-3.4873	Non-Stationary
LUNEMP	ADF(1)=AIC	-45.6023	-2.4326	-3.4873	Non-Stationary
	ADF(1)=SBC	-48.9294	-2.4326	-3.4873	Non-Stationary

AT FIRST DIFFERENCE

DIFFERENCE FORM	VARIABLE	ADF	VALUE	T-STAT.	C.V.	*Inference*
	DTERROR	ADF(1)=AIC	-57.3269	-7.9410	-2.8607	*Stationary*
		ADF(1)=SBC	-59.7833	-7.9410	-2.8607	*Stationary*
	DGDPPC	ADF(1)=AIC	96.5863	-3.0760	-2.8607	*Stationary*
		ADF(1)=SBC	94.1299	-3.0760	-2.8607	*Stationary*
	DTRADE	ADF(1)=AIC	48.3258	-5.8832	-2.8607	*Stationary*
		ADF(1)=SBC	45.8695	-5.8832	-2.8607	*Stationary*
	DEDU	ADF(5)=AIC	-0.67842	-4.4653	-2.8450	*Stationary*
		ADF(1)=SBC	-4.6006	-3.6475	-2.8607	*Stationary*
	DMILITARY	ADF(4)=AIC	-19.5714	-3.4857	-2.8449	*Stationary*
		ADF(1)=SBC	-22.2483	-4.6017	-2.8607	*Stationary*
	DUNEMP	ADF(1)=AIC	-46.5409	-5.1023	-2.8607	*Stationary*
		ADF(1)=SBC	-48.9973	-5.1023	-2.8607	*Stationary*

Table 3: Summary statistics for PP test for unit root

	AT LEVEL			
LEVEL FORM	VARIABLE	T-STAT.	C.V.	RESULT
	LTERROR	-3.5882	-3.4692	Stationary
	LGDPPC	-1.7815	-3.4692	Non-Stationary
	LTRADE	-1.3713	-3.4692	Non-Stationary
	LEDU	-1.8789	-3.4692	Non-Stationary
	LMILITARY	-4.6876	-3.4692	Stationary
	LUNEMP	-2.3451	-3.4692	Non-Stationary
	AT FIRST DIFFERENCE			
FIRST DIFFERENCE	VARIABLE	T-STAT.	C.V.	RESULT
	DTERROR	-10.5683	-2.9248	Stationary
	DGDPPC	-5.2376	-2.9248	Stationary
	DTRADE	-7.3958	-2.9248	Stationary
	DEDU	-6.5178	-2.9248	Stationary
	DMILITARY	-11.9740	-2.9248	Stationary
	DUNEMP	-7.9257	-2.9248	Stationary

Relying primarily on the AIC and SBC criteria, the conclusion that can be drawn from the above results is that *all the variables we are using for this analysis are I(1)*[12], except for LTRADE which is stationary at level form and thus gives us the rationale to proceed with testing of cointegration using ARDL (not Granger cointegration causality approach).

5.3 Determination of order of the VAR model

Before proceeding with the test of cointegration, we first need to determine the order of the Vector Auto Regression (VAR), i.e. the number of lags to be used. As per the table below, results show that AIC recommends order of four whereas SBC favors zero lag[13] (see Appendix 3A for details).

Table: Optimal Lag Length

	Selection criteria	
Optimal Lag Order	AIC	SBC
	4	0

Given this apparent conflict between recommendation of AIC and SBC, we address this in the following manner: (Pesaran & Smith, 1998) argue that the SBC should be given priority because it tends to define more parsimonious specifications whereas AIC gives relatively smaller standard error and thus estimates results with more precision. However, considering the trade-off of lower and higher orders, and realizing that all the observations in our study are annual we decide to choose the maximum lag order of 2 following (Pesaran et al., 1999).

5.4 Testing for Cointegration

Once we have established that the variables are I(1) and determined the optimal VAR order as 2, we are ready to test for cointegration.

Table 4: Summary results of critical bounds values

Level of Significance:	Lower Bound Value	Upper Bound Value
5%	3.0077	4.2531
10%	2.4818	3.6527

Table 5: Summary results of ARDL cointegration test

Dependent Variables	F-stats	Optimal lag order	Inference	
	Confidence Interval:		95%	90%
F(LTERROR|LGDPPC, LTRADE, LEDU, LMILITARY, LUNEMP)	2.0777	(2,0,0,2,0,1)	*No Cointegration*	*Inconclusive*
F(LGDPPC|LTERROR, LTRADE, LEDU, LMILITARY, LUNEMP)	2.2642	(1,1,2,2,1,1)	*No Cointegration*	*No Cointegration*
F(LTRADE|LGDPPC, LTERROR, LEDU, LMILITARY, LUNEMP)	12.1359	(2,0,2,2,1,0)	*Cointegration*	*Cointegration*
F (LEDU|LGDPPC, LTRADE, LTERROR, LMILITARY,LUNEMP)	3.1226	(1,2,0,0,1,0)	*Inconclusive*	*Inconclusive*
F(LMILITARY|LGDPPC, LTRADE, LEDU, LTERROR, LUNEMP)	6.5231	(2,0,0,2,0,0)	*Cointegration*	*Cointegration*

[12] The null hypothesis for the ADF test is that the variable is non-stationary. In all cases of the variable in level form, the test statistic is lower than the critical value and hence we cannot reject the null. Conversely, in all cases of the variable in differenced form, the test statistic is higher than the critical value and thus we can reject the null and conclude that the variable is stationary (in its differenced form).

[13] Based on highest computed values for AIC and SBC, after stipulating an arbitrary relatively high VAR order of 4.

F (LUNEMP|LGDPPC, LTRADE, LEDU, LMILITARY,LTERROR)	0.95677	(1,0,2,0,2,0)	*No Cointegration*	*No Cointegration*

Table 6: Summary statistics of diagnostics tests for ARDL bound testing

	LTERROR	LGDPPC	LEDU	LTRADE	LMILITARY	LUNEMP
R2	92.271%	99.781%	72.675%	98.311%	88.039%	87.327%
LR test for serial correlation	0.010089 (0.921)	0.30372 (0.586)	0.10866 (0.744)	0.50020 (0.485)	0.30754 (0.583)	0.00188 (0.989)
Ramsey's RESET test for Function form	0.3919 (0.533)	0.72221 (0.403)	0.13102 (0.720)	51.1877* (0.000)	1.8586 (0.182)	0.42969 (0.517)
Heteroscedasticity	0.83085 (0.367)	0.035143 (0.953)	1.6297 (0.209)	26.9799* (0.000)	1.5453 (0.221)	0.17952 (0.674)

** F-Statistics statistically significant (P-values are within the parenthesis)*

The calculated F-statistics for military spending and trade are greater than the upper critical bounds generated by (Pesaran et al., 2001) at 1% and 5% levels of significance when terrorism, GDPPC, education spending and unemployment are treated as dependent variables. Our analysis indicates that there are two cointegrating vectors which validate the existence of a long-run relationship between economic growth, terrorism, trade, education, military spending and unemployment in the case of Pakistan for the period of 1970–2014.

At the 5% significance level, diagnostic tests do not exhibit the violation of the classical linear regression model (CLRM) assumptions except for the model with trade as dependent variable, in which case we cannot accept null of no heteroscedasticity and functional form. Though heteroscedasticity may not be as such an issue in a time series macro variable, however, functional form misspecification (Ramsey RESET Test) could suggest that this variable is not linearly correlated or there is serial correlation in any of the models. The model can be further investigated through a model stability test as discussed in the next sections. At the same level of significance, there is no violation of no serial autocorrelation assumption in any in any of the series which indicates that all series are integrated at I(1). The coefficients of determination (R^2) for each of these model is 92.27%, 99.78%, 72.68%, 98.31%, 88.04% and 87.32% respectively which are reasonably high and confirm that the models are efficient in explaining the dependent variables.

We also tested the model with the Johansen multivariate approach to cointegration for robustness of long-run relationships. The findings show that there are at least two cointegration vectors between economic growth, terrorism, education spending, military spending and total trade in the case of Pakistan for the period of 1970–2014, which confirms the robustness of the long-run relation (Table 7).

Table 7: Summary results of test of cointegration LR test:

Maximal Eigenvalue of Stochastic Matrix				Trace test of Stochastic Matrix			
Null	Alternative	Statistic	5% CV	Null	Alternative	Statistic	5% CV
R = 0	R = 1	79.4205	43.6100	R = 0	R >= 1	187.2669	115.8500
R <= 1	R = 2	34.5278	37.8600	R <= 1	R >= 2	107.8463	87.1700
R <= 2	R = 3	30.8077	31.7900	R <= 2	R >= 3	73.3185	63.0000
R <= 3	R = 5	12.1349	19.2200	R <= 3	R >= 5	42.5108	42.3400
R <= 5	R = 6	7.0409	12.3900	R <= 4	R >= 5	19.1758	25.7700

Note: The asterisks ***, ** and * denote the significance at thee 1, 5 and 10% levels, respectively.

5.5 Pair-wise Granger causality among macroeconomic indicators and terrorism:

The next step is to investigate the direction of causality between economic growth, terrorism, trade, education spending, military spending and unemployment after finding evidence of cointegration. The pair-wise Granger causality approach is applied to ascertain the direction of causality between variables. The results of the Granger causality test are reported in Table 8.

The results of pair-wise granger causality test indicate that GDP Granger causes both terror and unemployment. Also, the results indicate that Terror and military Granger cause trade, whereas, trade Granger cause GDP. However, according to our analysis there is no causal relationship between unemployment and terror which is contrary to our expectation and needs further analysis. Recently (Nasir et al., 2008) investigated the direction of causal relationship between economic growth and terrorism and found no causality running either from economic growth to terrorism or from terrorism to economic growth. Moreover, the results also indicate no pair-wise direct causal relationship between military and education spending, however, there is a causal relationship from education to unemployment. The overall results of pair-wise causality are mixed and do not provide sufficient evidence to accept or reject the trade-off hypothesis of military spending at the cost of education spending and 'deprivation hypothesis' being the major cause of terrorism. Here we should acknowledge the limitation of Granger causality test as it may not necessarily be a true causality. If both *X* and *Y* are driven by a common third process with different lags, one might still fail to reject the alternative hypothesis of Granger causality. Therefore, to ascertain the cointegration amongst variables we proceed to the ARDL bounds testing approach.

Table 8: Summary results of Pairwise Granger Causality Tests[14]

Null Hypothesis:	F-Statistic	Prob.
LTERROR does not Granger Cause LGDPPC	0.19980	0.8197
LGDPPC does not Granger Cause LTERROR	8.02683***	0.0012
MILITARY does not Granger Cause LGDPPC	0.07711	0.9259
LGDPPC does not Granger Cause MILITARY	1.87350	0.1675
EDU does not Granger Cause LGDPPC	1.52983	0.2296
LGDPPC does not Granger Cause EDU	0.12666	0.8814
TRADE does not Granger Cause LGDPPC	4.20316**	0.0224
LGDPPC does not Granger Cause TRADE	0.40627	0.6690
UNEMP does not Granger Cause LGDPPC	1.03829	0.3639
LGDPPC does not Granger Cause UNEMP	3.42190**	0.0430
MILITARY does not Granger Cause LTERROR	0.46758**	0.0251
LTERROR does not Granger Cause MILITARY	0.62665	0.5398
EDU does not Granger Cause LTERROR	1.47633	0.2413
LTERROR does not Granger Cause EDU	0.00581	0.9942
LTERROR does not Granger Cause TRADE	3.43343**	0.0426
TRADE does not Granger Cause LTERROR	0.91394	0.4096

[14] Retrieved results from EVIEWS 9.0. See Appendices section.

UNEMP does not Granger Cause LTERROR	0.55581	0.5782
LTERROR does not Granger Cause UNEMP	1.56148	0.2230
EDU does not Granger Cause MILITARY	0.29350	0.7473
MILITARY does not Granger Cause EDU	0.35386	0.7043
TRADE does not Granger Cause MILITARY	0.53088	0.5924
MILITARY does not Granger Cause TRADE	3.22257**	0.0510
UNEMP does not Granger Cause MILITARY	2.50362	0.0952
MILITARY does not Granger Cause UNEMP	0.32513	0.7244
TRADE does not Granger Cause EDU	0.45086	0.6404
EDU does not Granger Cause TRADE	0.02836	0.9721
UNEMP does not Granger Cause EDU	0.34383	0.7112
EDU does not Granger Cause UNEMP	0.02273*	0.0975
UNEMP does not Granger Cause TRADE	0.02314	0.9771
TRADE does not Granger Cause UNEMP	1.37492	0.2652

Note: The asterisks ***, ** and * denote the significance at thee 1, 5 and 10% levels, respectively.

NOTE: *To ascertain the direction of causality between macroeconomic indicators we applied the VECM granger causality approach towards cointegration. However, the results stemming from this approach, with positive VECM terms and greater than unity coefficients, were not in-line with theoretical rational and are thus not reported here. For reference sake these results are included in the Appendices section of the report.*

5.6 Short-run and Long-run relationship between macroeconomic indicators:

So far we have established that there exist two cointegrating relationships amongst these variables, however, we have not determined that which variables are exogenous (leading) and which behave as endogenous (followers). Thus, we proceed with the ARDL approach, which not only provides us the information about independent and dependent variables but also indicates their short-run and long-run relative elasticities. However, as we are using macroeconomic variables, thus, we are more interested in the respective long run elasticities of the variables. The estimated results of ARDL cointergration tests for equations 1 to 12 as discussed in methodology section are presented in table 9 and 10. Lag orders have been selected through Akiake Information Criterion (AIC) for estimating ARDL model as AIC emphases on predicting best of the order of lags. This selection criterion, contrary to SBC, focuses on large value of likelihood and less concerned on over-parameter.

The statistical significance of lagged Error Correction Term i.e. ECM_{t-1} in table 9 indicates long-run Granger causality while the significance of t-statistics of the lagged explanatory variables show the short-run causal relationships amid the variables. The ECM term also provides us the verdict about leading and following indicators. A statistically significant ECM term of a dependent variable in the model indicates the endogeneity of the variable; whereas a non-significant term designates that variable as exogenous. At least one of the ECM_{t-1} terms should be significant for the validity of the cointegrating relationship among the variables in the long term. Also, the coefficient of ECM term measures the speed of adjustment of each endogenous variable towards the equilibrium.

The estimated results of our model suggest that military spending is the only exogenous (independent) variable with all other variables being endogenous. The results partially coincide with are a priori expectation that there is an opportunity cost associated to the military expenditure as spending on military puts a drag on the government budget to be allocated towards more instrumental variables for an economy such as

education, unemployment and trade. Due to lack of education and unemployment, the probability of unemployed people indulging into terrorist activities increases and ultimately stagnates economic growth.

Table 9: Summary of results for short-run elasticities

Dependent Variables	*Short-run relationship* Coefficient value (p-value)					
ARDL Model	**$\Delta\ln TERRO$ (2,0,0,2,0,1)**	**$\Delta\ln GDPPC_t$ (1,1,2,2,1,1)**	**$\Delta\ln TRADE_t$ (2,0,2,2,1,0)**	**$\Delta\ln EDU_t$ (1,2,0,0,1,0)**	**$\Delta\ln MILITAR$ (2,0,0,2,0,0)**	**$\Delta\ln UNEMP$ (1,0,2,0,2,0)**
$\Delta\ln TERROR_t$	-	0.001309 (0.650)	-0.0033325 (0.881)	-0.0089616 (0.820)	0.059960 (0.541)	0.062843 (0.615)
$\Delta\ln TERROR1$	0.42054 (0.015)**	-	-	0.060806 (0.101)	-	-
$\Delta\ln GDPPC_t$	13.1834 (0.000)***	-	-2.8124** (0.036)	1.6461** (0.021)	0.31192 (0.834)	-4.2755 (0.528)
$\Delta\ln GDPPC1_t$	-	-	-2.2748*** (0.045)	-	-	-15.1056** (0.015)
$\Delta\ln TRADE_t$	0.04032*** (0.000)	- 0.05118*** (0.013)	0.42016*** (0.003)	-0.051487 (0.616)	3.0586*** (0.000)	-2.5240** (0.016)
$\Delta\ln TRADE1_t$	-	0.048416*** (0.008)	-		-1.4436)*** (0.029)	-
$\Delta\ln EDU_t$	-0.1951 (0.782)	0.001769 (0.890)	-0.035466 (0.721)	-	-0.33928 (0.393)	-0.77584 (0.134)
$\Delta\ln EDU1_t$	-	0.042546*** (0.002)	0.2290** (0.040)		-	1.0576 (0.075)*
$\Delta\ln MILITAR1$	0.27923 (0.105)	0.0031369 (0.488)	0.13811*** (0.000)	0.033143 (0.428)	-	0.018238 (0.880)
$\Delta\ln MILITAR1$	-	-	-	-	-0.28101** (0.031)	-
$\Delta\ln UNEMP_t$	0.19902 (0.351)	-0.0050469 (0.182)	-0.031516 (0.198)	-0.055118 (0.143)	-0.12132 (0.248)	-
$\Delta\ln UNEMP1_t$	-	-		-	-	-
ECM_{t-1} *Long Run Relationship*	**-1.2976*** (0.000)**	**-2.9874*** (0.005)**	**-0.28210*** (0.000)**	**- 0.39439*** (0.008)**	**0.080544 (0.525)**	**- 0.38093*** (0.007)**
Inference	Endogenous	Endogenous	Endogenous	Endogenous	Exogenous	Endogenous

Note: The asterisks ***, ** and * denote the significance at thee 1, 5 and 10% levels, respectively.

The results in table 9 highlight that in the short run, statistically significant variables are GDP growth, trade and military spending. In the short run, trade and GDP growth are the explaining variables for terrorism. GDP growth depends on education and trade whereas education and unemployment significantly explained by GDP growth and trade in the short run, suggesting a two way causality between education and GDP growth. However, long run analysis in table 10 elicits a significant relationship of terrorism with military spending and education. One might expect a negative relationship between terrorism and military spending i.e. more military spending will ultimately curtail terrorism, however, contrary to expectation, terrorism is positively and significantly related to military spending in Pakistan. It might be surprising given trillions of

US dollar worth military spending over the course of 14 years of 'war on terror' but the most plausible inference is that a military response on its own could at best be a short term deterrent against terrorism.

Table 10: Summary of results for long-run elasticities:

Dependent Variables	*Long-run relationship* Coefficient value (p-value)					
ARDL Model	LTERROR	LGDPPC	LTRADE	LEDU	LMILITARY	LUNEMP
	(2,0,0,2,0,1)	(1,1,2,2,1,1)	(2,0,2,2,1,0)	(1,2,0,0,1,0)	(2,0,0,2,0,0)	(1,0,2,0,2,0)
LTERROR	-	0.042776** (0.038)	-0.011813 (0.880)	-0.27257 (0.199)	0.74444 (0.638)	0.16498 (0.633)
LGDPPC	10.1595*** (0.000)	-	-1.3811 (0.178)	4.1737 (0.104)	3.8726 (0.864)	-1.1468 (0.801)
LTRADE	0.031072 (0.928)	-0.2236*** (0.014)	-	-0.13055 (0.600)	5.8454 (0.605)	-2.5018** (0.028)
LEDU	1.0582* (0.064)	-0.20891 (0.109)	-0.60157 (0.105)	-	-4.2123 (0.664)	-3.6718** (0.020)
LMILITARY	0.21518* (0.078)	-0.021543 (0.341)	-0.060489 (0.508)	0.27143* (0.067)	-	0.047878 (0.881)
LUNEMP	-0.12354 (0.402)	0.001632 (0.948)	-0.11172 (0.166)	-0.13975 (0.119)	-1.5062 (0.575)	-
INPT	-105.1785*** (0.000)	11.2171*** (0.000)	17.8054* (0.090)	-41.1342 (0.123)	-25.7660 (0.908)	26.8285 (0.588)
F-Stat (Joint Significance)	5.2308*** (0.000)	4.4676*** (0.001)	9.6515*** (0.000)	3.1709*** (0.011)	14.6298*** (0.000)	2.3820** (0.037)

*Note: The asterisks ***, ** and * denote the significance at the 1, 5 and 10% levels, respectively.*

Another interesting result of our study is a positive relationship between GDP growth and incidence of terrorism in the long run. The rise in per capita income (economic growth) contributes to terrorism. Apparently, counter-intuitive, the main reason for this might be the unequal distribution of income after economic growth, resulting in acute economic disparity within different factions of the society, benefiting a chosen few at the expense of an overwhelming majority of the population, leading to a high sense of deprivation which then translates into increased terrorism in Pakistan. This result is also consistent with the 'modernization theory' according to which unequal growth may lead to a situation where a country is being worse off than before the growth had actually happened as economic disparity may fuel social and political unrest. The studies performed by (Lai & Thyne, 2007), (Freytag & Thurik, 2010), (Caruso & Schneider, 2011) and (Ismail & Amjad, 2014) revealed similar results.

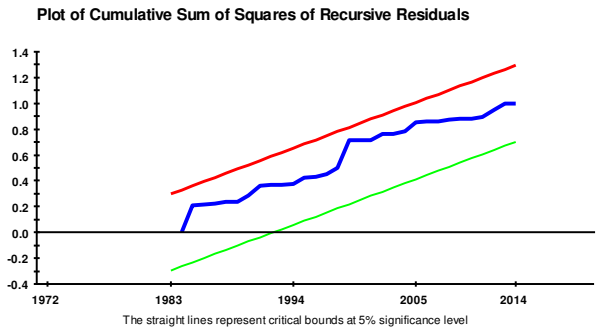
The results also corroborate that GDP growth depends on trade in the long run. The causal relationship between GDP growth, trade and terrorism can thus be explained that a rise in terrorism impacts international capital and trade flows by lowering foreign direct investment, lowering domestic output and an increased capital outflow (Shahbaz et al., 2013). This leads to a decreased share of the country's exports in international markets and decreased GDP. This stimulates further increase in unemployment which in turn increases terrorist activities. Another conforming outcome of our results is the long term dependency of education spending on the military spending which resonates with our earlier 'trade-off hypothesis' that the government has to cut the education budget in order to cater the terrorist risk and invest more on defense and military

expenditures. The results that unemployment in the long run is dependent upon trade, GDP growth and education also substantiates our earlier results and corroborates the discussed theoretical underpinnings. The coefficients of ECT of all the endogenous variables are normal; i.e. have negative signs and range between -1 and 0. The statistically significant F-statistics of each model indicates the overall validity of the results and are presented at the bottom line of table 10.

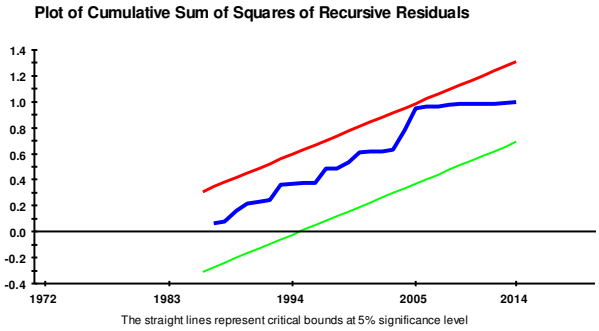
5.7 Stability tests

We then tested the 'stability' of the coefficients of the equations with the help of CUSUM and CUSUMSQ tests and we find that the coefficients are all stable since they are all within the 5% critical bounds. Only CUMSQR tests results are reported here (Figure 3) and CUSUM tests results are reported in the appendices section.

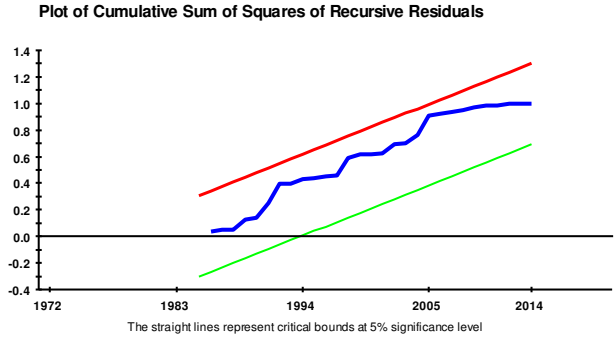
Figure 3: Plot of Cumulative Sum of Recursive Residuals



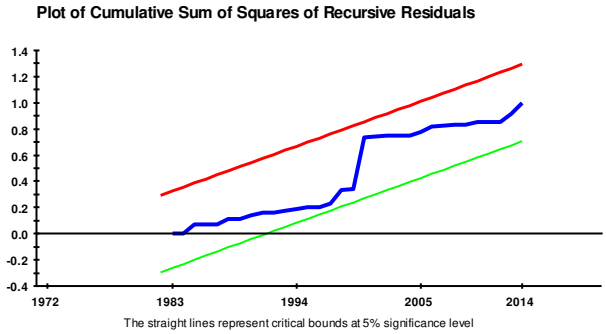
[LTERROR]



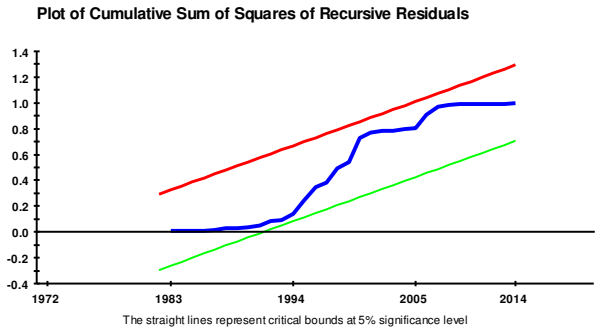
[LGDPPC]



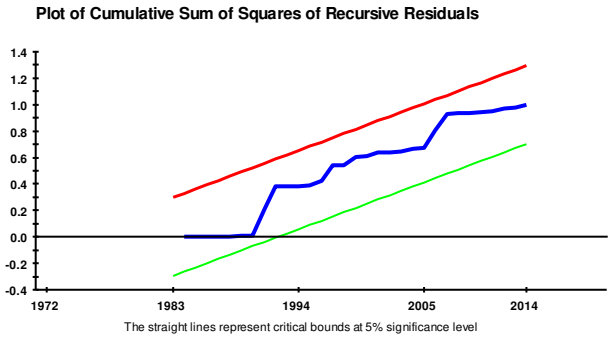
[LEDU]



[LTRADE]



[LMILITARY]



[LUNEMP]

5.8 Variance Decomposition of Forecast Errors (VDC)

The VDC decomposes the variance of the forecast error of a particular variable into proportions attributable to shocks (or innovations) in each variable in the system including its own.

Table 11: Summary results of generalized VDC

Variables	LTERROR	LGDPPC	LTRADE	LEDU	LUNEMP	LMILITARY	TOTAL	SELF-DEP	RANKING
1-YEAR HORIZON									
LTERROR	79%	8%	4%	6%	3%	1%	100%	79%	4
LGDPPC	3%	81%	9%	3%	3%	0%	100%	81%	3
LEDU	0%	10%	56%	0%	30%	4%	100%	56%	6
LTRADE	1%	2%	1%	81%	4%	11%	100%	81%	2
LUNEMP	2%	5%	32%	0%	59%	3%	100%	59%	5
LMILITARY	2%	5%	1%	2%	2%	88%	100%	88%	1
3-YEAR HORIZON									
LTERROR	61%	16%	1%	8%	1%	13%	100%	61%	4
LGDPPC	5%	68%	15%	4%	7%	1%	100%	68%	1
LEDU	1%	17%	53%	0%	19%	9%	100%	53%	6
LTRADE	5%	4%	2%	66%	7%	16%	100%	66%	3
LUNEMP	5%	4%	28%	1%	53%	9%	100%	53%	5
LMILITARY	2%	8%	4%	17%	2%	67%	100%	67%	2
5-YEAR HORIZON									
LTERROR	56%	22%	3%	7%	1%	12%	100%	56%	3
LGDPPC	5%	51%	22%	7%	11%	4%	100%	51%	4
LEDU	4%	18%	50%	1%	17%	9%	100%	50%	5
LTRADE	6%	6%	2%	62%	9%	16%	100%	62%	2
LUNEMP	4%	4%	25%	2%	48%	16%	100%	48%	6
LMILITARY	3%	7%	4%	18%	2%	65%	100%	65%	1
10-YEAR HORIZON									
LTERROR	47%	25%	9%	7%	3%	10%	100%	47%	3
LGDPPC	5%	36%	29%	8%	13%	10%	100%	36%	6
LEDU	7%	24%	46%	2%	14%	8%	100%	46%	4
LTRADE	6%	7%	2%	59%	8%	18%	100%	59%	2
LUNEMP	4%	4%	24%	4%	43%	21%	100%	43%	5
LMILITARY	4%	8%	5%	18%	2%	63%	100%	63%	1

The relative exogeneity/endogeneity of a variable can be determined by the proportion of the variance explained by its own past shocks. Thus the variable which is explained mostly by its own shocks (and not by others) is deemed to be the most exogenous of all. The source of this forecast error is the variation in the current and future values of the innovations to each endogenous variable in the VAR. There are two sorts of VDC analysis; Orthogonal and Generalized. Orthogonalized VDC depends on the particular ordering of the

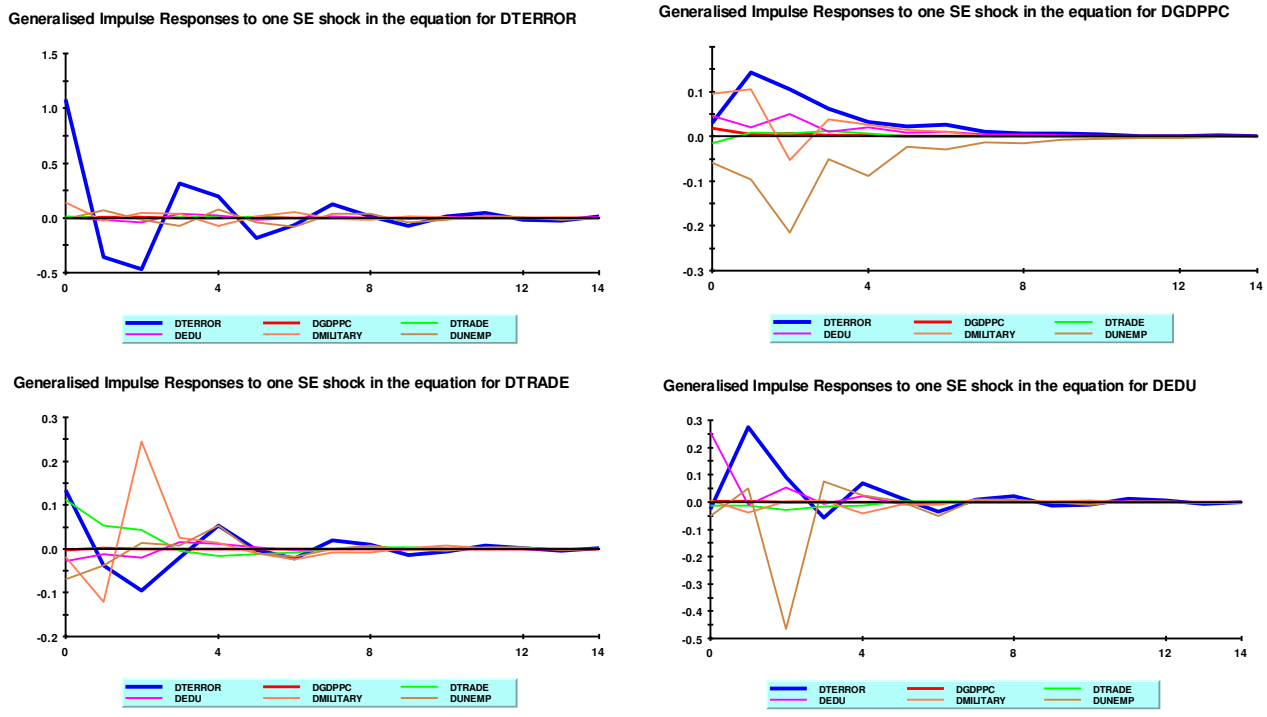
variables in the VAR, and also assumes that when a particular variable is shocked, all other variables in the system are switched off. That is why, the rank of exogeniety obtained from orthogonalized VDC changes dramatically if you alter the ordering of the variables in the VAR. For example, the first period decomposition for the first variable in the VAR ordering is completely due to its own innovation. Therefore, we use Generalized VDC for our analysis as it does not employ such assumptions (Pesaran & Shin, 1998). The results drawn from orthogonalized VDCs are still reported in the appendices section of the report.

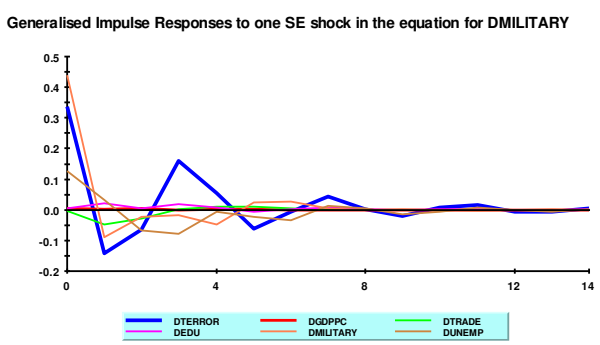
According to the reported statistics in the above table, in case of a one-year time horizon, the most exogenous variable is the military spending and the most endogenous variable is the education spending. The results are intuitive on the ground that due to a trade-off between military and education spending, government has to have given priority to the defense sector over education within its limited budget constraints and to prevent terrorism. Although, the results suggest some variations in the relative ranking of exogeneity within different time horizons, we can observe some consistencies as well. For example, in almost all other time horizons, education and unemployment are ranked as the most endogenous and thus most influenced by the military spending and trade being the most exogenous or self-dependent. However, the relative exogeneity of GDP per capita exhibit a changing trend throughout being the most exogenous in 3 year horizon with 68% self-dependency to rank 6 with 36% exogeneity over a ten year horizon. This changing trend in GDP suggests that in the long run GDP growth depends more on other variables like military spending, trade and terrorism.

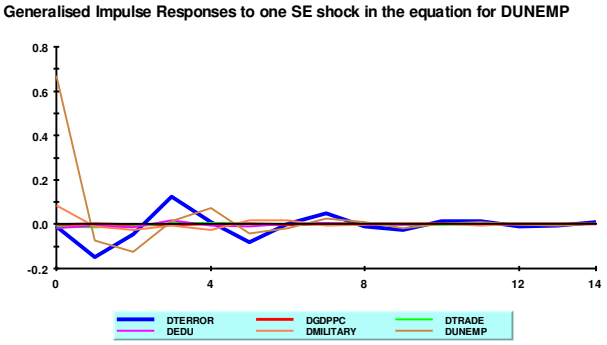
5.9 Impulse Responses (IR) Function

The information contained in the VDCs can be equivalently represented by IRFs. Both are obtained from the MA (residuals) representation of the original VAR model. IRFs essentially map out the dynamic response path of a variable owing to a one-period standard deviation shock to another variable. The graphs of IR are presented in figure 4.

Figure 4: Plot of generalized impulse response for each dependent variable







From the above graphs we can observe that military spending, education spending and GDP growth are the most influential variables in explaining terrorism. The shock in education spending also brings about a lot of variation in unemployment. However, a shock in terrorism does not bring about much variations in the economic variables, which is somewhat against the economic rationale. However, a possible explanation could be that in the aftermath of Pakistan's participation in the 'war against terror', the generous economic aid and debt rescheduling by the international community has rescued the country and the impact of terrorism has not dampened the economic growth in a way it could have had otherwise done.

Section 6: Caveats / Limitations of study and future directions for research

1. As already mentioned, the results obtained from VECM Granger Causality Approach were showing anomalous results with high positive error correction terms. The possible reasons could either be the presence of serial autocorrelation because of using more parsimonious lag order selection or it could be the presence of structural breaks within the time series data. This research can be extended by introducing dummy variables for any structural breaks.
2. Pakistan is a developing country in which the institutions of political representation have not developed substantially and the army remains a powerful political force. Thus, an important macroeconomic variable of Political Instability can be incorporated to extend the scope of study to a higher level and increase its cross-discipline appeal.
3. Also, one of the caveats of ARDL bound testing for establishing long run relationships is that ARDL model is a single equation model that does not remain consistent in presence of simultaneous equations. Therefore, in future research more advanced and better econometric models can be deployed for a more robust and technically correct estimation.

Section 7: Conclusion & policy implications

Terrorist attacks can have significant negative effects on economic performance but measuring such impact with a higher degree of certainty is inherently challenging. In addition, while there is a wide range of factors which give rise to terrorism, economic factors also play a role. With the help of the ARDL bounds testing approach followed by variance decomposition (VDC) and impulse response (IR) analyses, this study provides empirical investigation of the economic causes of terrorism in Pakistan and suggests certain effective counterterrorism policies.

Pakistan is a poor and insecure state that has sustained itself throughout the years with external support against perceived existential threats emanating from its immediate neighborhood. Poverty, illiteracy, population explosion, lack of democratic culture and an increasing sense of deprivation and insecurity

amongst the masses are important glitches and must be effectively dealt with irrespective of the incidence or absence of terrorism. Rather than securing the vital socio-economic interests of literacy, employment and internal harmony of the country, the state has been busy fighting a spillover of terrorism from Afghanistan along with an enduring quest for security amidst a hostile and hegemonistic India. This has collectively over the years lead to a quagmire of terrorism and internal instability.

The main objective of this paper was to determine any causal relationship amongst the variables of economic growth, military expenditure, education expenditure, unemployment rate and trade on the onslaught of terrorism in Pakistan. The results of the overall study clearly conform to the 'deprivation hypothesis' that underdevelopment and poverty in Pakistan have provided fertile grounds to terrorists for new recruits. The ARDL bound testing results suggest that military spending is the only exogenous variable in determining terrorism in Pakistan. This implies that gradual reduction in military spending relative to education budget could be used as policy instrument as military expenditure significantly influences education spending, which in turn is directly linked to unemployment, GDP growth and trade and, thus, either hinders or leads towards terrorism.

According to our analysis, in the short run terrorism in Pakistan is most affected by its overall trade and GDP growth while in the long run terrorism elicits a significant relationship with military spending and education. One might expect a negative relationship between terrorism and military spending i.e. more military spending will ultimately curtail terrorism, however, contrary to expectation, terrorism is positively and significantly related to military spending in Pakistan. It might be surprising given trillions of US dollar worth military spending over the course of 14 years of 'war on terror' but the most plausible inference is that a military response on its own could at best be a short term deterrent against terrorism. This coupled with the fact that 97.4% of all terrorist incidents in the past decade were in under developing countries and over 80 per cent of the lives lost to terrorist activity in recent years occurred in five developing countries - Iraq, Afghanistan, Pakistan, Nigeria and Syria – highlights that no military expenditure will bear fruit unless a specific development threshold has been achieved as is in several western countries. Indeed, among the five countries accounting for the bulk of terrorist attacks, the U.S. has prosecuted lengthy ground wars in two (Iraq and Afghanistan), a drone campaign in one (Pakistan), and airstrikes in a fourth (Syria) but even with the military might of the US, nothing seems to check the exponential growth of terrorist activities. We believe that spending more and more on military involvement in the name of 'war against terror' would only make matters worse. So, the most important resolution to help the host country against terrorism can probably be political and economic, not military. The slogans of 'Trade not Aid' and 'Cooperation is Education' are probably better and workable counter-terrorism policy narratives in the long run for a developing country like Pakistan.

Another interesting result of our study is a positive relationship between GDP growth and incidence of terrorism in the long run i.e. the rise in per capita income (economic growth) contributes to terrorism. Apparently, counter-intuitive, the main reason for this might be the unequal distribution of income after economic growth, resulting in acute economic disparity within different factions of the society, benefiting a chosen few at the expense of an overwhelming majority of the population, leading to a high sense of deprivation, which then translates into increased terrorism in Pakistan. This result is also consistent with the 'modernization theory' according to which unequal growth may lead to a situation where a country is being worse off than before the growth had actually happened as economic disparity may fuel social and political unrest. The studies performed by (Lai & Thyne, 2007), (Freytag & Thurik, 2010), (Caruso & Schneider, 2011) and (Ismail & Amjad, 2014) revealed similar results.

An added objective of the study was to establish the relative endogeneity and exogeneity of these macroeconomic variables and terrorism i.e. what variables actually need to be influenced to achieve the desired counter-terrorism results. As eluded to earlier, military spending is the most instrumental in impacting

most dependent variables of education, unemployment etc. Another important implication out of the Impulse Response Analysis in the study is that one standard deviation shock in terrorism has least effect on all of the macroeconomic variables. A possible explanation could be that in the aftermath of Pakistan's participation in the 'war against terror', the generous economic aid and debt rescheduling by the international community has rescued the country and the impact of terrorism has not dampened the economic growth in a way it could have had otherwise done.

However, we cannot ignore the fact that the effects of terrorism are transmitted to economic growth through various channels. It is only a stable economic system which can develop the desired immunity to face the challenges of domestic terrorism and security issues internal to the country. Short term counter-terrorism and policing strategies can often be critical to prevent the potential of large and unexpected acts of mass violence; however, longer term approaches are essential. These longer term priorities include the need to address the issues of unemployment, education, poverty, inequality and improving access to justice and rule of law.

Summarily, terrorism has adversely affected Pakistan's development and imposed heavy economic burden by indirectly steering the state focus away from socio-economic development to mere security concerns. The general loss of confidence in the economy and the consequent inability to attract foreign inflows, coupled with high military expenditure and poor educational and trade infrastructure lead to economic distortions impacting economic growth and causing instability. However, effective action to combat terrorism must take cognizance of both the 'deprivation hypothesis' as well as the 'modernization hypothesis'. Where on one side increased economic growth through better education, balanced trade and attenuated military expenditure would take away the incentive for the impoverished to join the ranks of terrorists, an uneven growth is equally likely to reinvigorate the spiral of intolerance, violence and terrorism in the country. There is a dire need to strike a cautious balance between hard military power and development sectors of the economy in order to ensure a fair and equitable distribution of resources that is beneficial as well as sustainable.

Our analysis should give policymakers at least some rough clues about what is at stake economically in the wake of a severe terrorism wave in Pakistan. Furthermore, at a broader level, perhaps the best way to nip terrorism in the bud is pursuing policies which are conducive for balanced economic growth. Our econometric analysis of Pakistan indicates that a strong economy is a powerful antidote to terrorism. Better military and civilian intelligence will also help, as will effective poverty eradication programs that render a stable Pakistan less susceptible to the ideological propaganda of extremist groups. To conclude, while terrorism in Pakistan is a multidimensional issue, we hope that our analysis can contribute toward a better and richer understanding of its causes and device policies.

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