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War on Terror: Do Military Measures Matter? Empirical Analysis of Post 9/11 Period in Pakistan

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Abstract

This paper is the first attempt to investigate the causal relationship between military spending, terrorism, and intensity of terrorism in Pakistan, by applying ARDL approach to cointegration and VECM Granger-causality analysis. The results indicate that terrorism intensity, rather than the number of terrorist incidents, is the major determinant of military spending in both short-run and long-run. The study finds unidirectional causality running from terrorism intensity to military spending. The failure of military measures to curtail terrorism and its intensity induces one to suggest improved involvement of civil intelligence agencies by raising their budgets instead of military budget.

Key Words: Causality Analysis; Military Spending; Civil Intelligence; Terrorism
JEL Codes: C12, C32, O16

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1. Introduction

The world has witnessed tremendous increase in terrorist and violent incidents of amplified intensities in the first decade of the new millennium. Consequently, a rich literature emerged on the causes and consequence of terrorism. Although controversies still exist on the determinants of violence, a consensus is developed among the scholars and policy makers about the adverse consequences of violent incidents for the economy. As a result, anti-terrorism efforts remain high on the political agenda of nations all over the world. Indeed, eradicating the core causes of terrorism is the only sustainable solution to the problem. This, however, is a long-term process and relying only on this solution may be a dreadful mistake. The immediate solution, therefore, requires policies aimed at strengthening the security system. This paves the way for increasing budgets for military spending in most of the countries, and Pakistan is no exception.

Majority of the terrorism and armed conflicts have been observed in low-middle-income countries [Gupta et al. 2004]. Of all the middle-income countries, Pakistan has suffered from highest number of terrorist attacks in the last few years. These attacks were intensive in terms of casualties as well. For instance, from summer of 2007 to late 2009, more than 5,500 people were killed in suicidal bomb blasts and other attacks on civilians. The attacks have been attributed to a number of reasons: sectarian violence - mainly between Sunni and Shia Muslims; the easy availability of guns such as AK-47 and spread of weapon culture; and the influx of ideologically driven "Afghan Arabs" based in or near Pakistan, originating from the USSR-Afghanistan war 1980s which blew back into Pakistan.

After the bloodbath of 9/11, the joint attack by the US and coalition forces on Afghanistan ended the Taliban's regime. The Taliban could not counter the invaders' air-strikes and were order to disperse by Mulla Omer; the Taliban's supreme commander. However, after couple of years the Taliban came out from their hideouts and started attacking the coalition forces in Afghanistan. It was perceived that Al-Qaeda, Taliban supporters and other Islamist combative found safe sanctuary in the rugged Pakistan-Afghanistan border region, forcing Pakistan to conduct a military operation in 2004 in Waziristan; one of the agencies in the Federally Administered Tribal Areas (FATA) of Pakistan. This military operation together with the drone attacks by the US led to the emergence of what is now called Pakistani Taliban. Tahreek-e-Taliban Pakistan (TTP), one of the most influential and dangerous groups among the Pakistan Taliban, declared a war initially against Pakistan Army. In retaliation to the collateral damage, this war spread to the rest of the FATA region. Afterward, the terrorist attacks spread in entire country, resulting in numerous casualties (Kronstadt, 2007). This domestic terrorism in Pakistan has turn out to be a serious problem distressing major Pakistani cities. There were signs of the so called "Talibanization" in the country which became major concern for the Government of Pakistan and it started taking serious actions against it. All these factors were used as rationale for increasing military budget to fight the so-called war on terror. Subsequently, the defense budget has been on the rise and even for the fiscal year 2011-12, the Parliament's Standing Committee for Defense has approved an increase of 13%-18%. Such high increases in defense budgets are usually at the cost of developmental expenditures but are not much opposed by the masses assuming that they are used for curtailing terrorism.

In this backdrop, the study in hands aims to examine whether or not the mere increased allocation of resources for defense expenditure is fruitful in reducing the number of terrorist incidents or their intensity (or both) in the terrorism-victimized country of Pakistan. The study explores whether it is actually the number of terrorist incidents or the intensity of these incidents that are critical to increment in military budget. It is worth mentioning here that this study makes a contribution to the existent literature in the sense that it is the first attempt to incorporate both terrorism and its intensity simultaneously. For this purpose, use is made of both the Autoregressive Distributed Lag (ARDL) bounds testing approach and Granger-causality analysis within vector error-correction models (VECM).

Rest of the study proceeds as follows; Section 2 discusses detailed literature on the topic. The third Section gives theory and the subsequent econometric specification. Section 4 gives a brief description of data and methodology used in the analysis. Results and discussed in fifth Section, while Section 6 concludes the study.

2. Review of Literature

The ample and extensive literature available on conflict and terrorism can broadly be classified into several categories, which are one way or the other related to each other. For instance, one ilk of literature studies the economic cost of armed conflicts for economies [see, for example, Abadie and Gardeazabal (2003), Venieries and Gupta (1986), Barro (1991), Alesina and Perotti (1993, 1996), Alesina et al. (1996), Rodrik (1999), Arunatilake et al. (2001) and, Richardson and Samarasinghe (1991)]. Likewise, a series of literature focuses on the relationship between defense spending on economic growth. Nevertheless, mixed results are found regarding the

direction of impact. For example, Benoit (1978) concludes that the effect of defense spending on economic growth is positive in less developed countries. On the other hand, however, Arora and Bayoumi (1993) and Knight et al. (1996) find that a fall in defense spending stimulates the pace of economic growth. This is due to the fact that lower military spending promotes economic growth by the augmentation of capital formation and the upgrading of competence with which resources are consumed in the economy (Gupta et al. 2004). Similarly, contradictory results are reported in various studies conducted for specific countries. Sezgin (1997, 2001) has analyzed the defense spending pattern of Turkish economy from the year 1950 to 1994 and has proven the existence of a positive relation between defense spending and economic growth. Conversely, in the case of Greece, Sezgin (2000) finds an inverse relationship between defense spending and economic growth.

Likewise, another group in the conflict literature tries to identify the fiscal impact of counter-terrorism actions. Some studies have also established the link between defense spending and economic growth as well as between economic growth and tax policy of a country. For example, Caroll (2006) explores that the spending for national defense directly manipulates the federal corporate income tax rate. Furthermore, the economic cost of counter-terrorism measures and the ensuing effects on the fiscal balance have also been investigated (Lis, 2007). The study confirms the crowding-out of productive investment due to security issues and the resultant increase in defense spending, leading to reduction in resource availability for any other productive activity. Interestingly, Blomberg *et al*. (2004) believe that although terrorist attacks do give way to an increment of government spending, yet this ascend can compensate the abridged investment spending of the same quantity in the short run.

There had been a wide debate on the relationship between expenditures being done on military defense and level of terrorism prevailing in the country. Literature on this issue has unanimously concluded the fact that there is no nexus between defense expenditures and terrorism incidents. Theoretical stance expects to have significant decrease in terrorist activities, as defense expenditure increases, so that military measures can be effective in suppressing terrorism. Even so, the literature does not support this presumption, suggesting such futile military interventions may well be counterproductive. Empirical literature in this area (Brophy-Baermann and Conybeare, 1994; Cauley and Im, 1988 and, Enders and Sandler, 1993) has compared the number of terrorist attacks before and after the effectuation of counter-terrorism military activities, so that the impact of such policies on terrorism can be gauged. On similar lines, Landes (1978), Sandler (2005) and Silke (2005) have a consensus that taking vehement measures for controlling terrorism, ironically, instead of thwarting them, stimulate such attacks.

Likewise, Omand (2005) alleges that the absence of comprehensive long-term strategy for combating terrorism at international level impedes such attempts nationally. In case of United States, Lum *et al*. (2006) refute the effectiveness of counter-terrorism measures, concluding that such measures tend to provoke terrorism further. Moreover, in case of Turkey, Feridun and Shahbaz (2010) find, conversely, a uni-direction causality running from terrorist attacks to defense spending.

For this reason, it can be asseverate that existing literature denies the role of military measures in ebbing terrorism. However, the entire literature on the linkage between terrorism and military spending concentrates merely on terrorism and not on its intensity. Even the uni-directional

causality running from terrorism to military spending needs to be reassessed by modeling together the three variables namely terrorism, intensity of terrorism and military spending. With this milieu, the present article intents to enrich the available literature by not only assessing the effectiveness of military measures in deterring terrorism in Pakistan, but also by evaluating the distinct effects of terrorism and its intensity on defense spending.

3. Theory and Econometric Specification

This section discusses the theoretical foundations linking military spending, terrorism and intensity of terrorism. However, before these channels are explained, it would be expedient if terrorism and the intensity of terrorism are discussed and distinguished. Terrorism is simply the number of terrorist incidents occurred during a particular period. On the other hand, terrorism intensity is measured by the number of casualties, inclusive of both deaths and injuries, occurred as a consequence of a particular terrorist attack. In this regard, first, the possible channels through which terrorism or its intensity affect defense spending are explored. Next, the theoretical possibilities of the impacts of military spending on terrorism are discussed. Finally, the estimable econometric specification is formulated in the light of these theoretical considerations.

It is now an established fact, with empirical support, that an upsurge in terrorist incidents leads to higher expenditures on defense. The reason for this positive association is the common belief that increment in military spending is the most effective and in fact the only possible measure that could be taken for combating terrorism. People look up to the military forces as their only saviors and this provides grounds to ask for more military budget. It is believed, at least

theoretically, that the higher the number of terrorist attacks, the easier it will be to gain public support to convince the policy makers to allocate more resources to defense expenditures. Therefore, with this perspective, there expects to be a positive relation between terrorist incidents and military spending.

As mentioned earlier, this study is the first and foremost attempt to incorporate the intensity of terrorism as a separate variable in the estimation of relationship between terrorism and defense spending. We believe, based on our experiences and interactions with people in Pakistan, that it is not the number of terrorist incidents but actually its intenseness which is crucial to spur on military expenditures. For example, several blasts in which there is no casualty may not be equivalent in spreading terror to a single blast engulfing hundreds of human lives. Especially in Pakistan, a terrorist attack which is unsuccessful in terms of casualties is no more a paramount news. People have become used to such news. Nonetheless, attacks taking human lives do have detrimental psychological effects and spread fear among the masses. It is this fear of the intensity of terrorism which actually instigates the demand of security from the masses and so empowers the policy makers to enhance defense budget. For these reasons, one can expect positive impact of terrorism intensity on military expenditures.

Next we assess the linkage between military spending and terrorism treating latter as a dependant variable. It is already notified in previous section that most of the empirical literature rejects causality running from military spending to terrorism. However, based on theoretical assertions, it is expected that a rise in defense spending must lead to a lessening of terrorist activities believing that military measures are effective in combating terrorism. Nevertheless, as brought

into light by some studies mentioned above, it is also important to note that counter-terrorism measures may also be counter-productive and may spark up terrorism as its repercussion. Furthermore, there can be another indirect channel as well, at least theoretically, through which rise in military spending may dilate terrorism. If in a country, the economic conditions do play a role in terrorism, then diverting resources to military spending will leave little in the budget to spend on ameliorating the economic environment of the "haves-not". In fact, such diversion may worsen their situation. Hence, one may expect both positive and negative impact of military spending on terrorism; both in terms of attacks and intensity.

As, we are interested in investigating the short run and long run effect of terrorism and its intensity on military expenditure, thus, in the light of above discussion, primarily the following econometric specification will be estimated.

$$lmil_t = \alpha_0 + \alpha_1 lti_t + \alpha_2 lta_t + \varepsilon_t \qquad (1)$$

Where $lmil_t$ represents the natural log of military spending, lti_t is the natural log of intensity of terrorism, lta_t is the natural log of terrorist incidents and ε_t is regression error term. α_1 and α_2 are the two coefficients and, based on theoretical considerations, there signs are expected to be positive.

4. Methodology and Data

4.1 Methodology

This study explores the relationship among military spending, terrorism and intensity of terrorism. The use of time series data for analysis calls for testing of stationarity of all the variables. This is a critical prerequisite to circumvent the problem of spurious regression. If the Ordinary Least Square (OLS) regression is applied to non-stationary variables used in level form, the coefficients obtained as a result will be meaningless. Nonetheless, several procedure are available to explore cointegration in non-stationary series; Engle–Granger's (1987); two-step Johansen's (1992) maximum likelihood; Pesaran–Shin's (1999) and Pesaran et al. (2001) Autoregressive Distributive Lag (ARDL) models. Engle–Granger's approach does not offer the best choice if more than one cointegrating vector is present (Seddighi et al. 2006). However, between the Johansen's (1992) maximum likelihood method and the Pesaran et al. (2001) ARDL method to cointegration, the latter is preferred for three obvious reasons; first, this approach can be applied irrespective of whether the variables are *I(0)* and *I(1)*; second, the small sample properties of the ARDL approach are far superior to that of the Johansen and Juselius's cointegration technique (Pesaran and Shin, 1999). Thirdly, ARDL model helps to derive dynamic error correction model through a simple linear transformation without losing information about long span of time. The error correction model integrates the short-run dynamics with the long-run equilibrium without losing information about long-run.

The ARDL bounds testing approach to cointegration involves estimating the unrestricted error correction method (UECM) of the ARDL model as follows:

$$\Delta lmil_t = \alpha_1 + \alpha_{mil} lmil_{t-1} + \alpha_{ti} lti_{t-1} + \alpha_{ta} lta_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta lmil_{t-i} + \sum_{j=0}^{q} \alpha_j \Delta lti_{t-j} + \sum_{l=0}^{m} \alpha_k \Delta lta_{t-l} + \mu_{1i} \quad (2)$$

$$\Delta lti_t = \beta_1 + \beta_{ti} lti_{t-1} + \beta_{ta} lta_{t-1} + \beta_{mil} lmil_{t-1} + \sum_{i=1}^{p} \beta_i \Delta lti_{t-i} + \sum_{j=0}^{q} \beta_j \Delta lta_{t-j} + \sum_{l=0}^{m} \beta_k \Delta lmil_{t-l} + \mu_{2i} \quad (3)$$

$$\Delta lta_t = \delta_1 + \delta_{mil} lmil_{t-1} + \delta_{ti} lti_{t-1} + \delta_{ta} lta_{t-1} + \sum_{i=1}^{p} \delta_i \Delta lta_{t-i} + \sum_{j=0}^{q} \delta_j \Delta lti_{t-j} + \sum_{l=0}^{m} \delta_k \Delta lmil_{t-l} + \mu_{3i} \quad (4)$$

The α_1, β_1 and δ_1 are drift components and μ_i is assumed to be white noise residual term. The akaike information criterion (AIC) is used to select the optimal lag structure to make sure that serial correlation does not exist. Pesaran et al. (2001) tabulated lower critical bound (LCB) and upper critical bound (UCB) to take decision whether long run relation between the variables exists or not. The null hypotheses of no cointegration are $H_0 : \alpha_{mil} = \alpha_{ti} = \alpha_{ta} = 0$, $H_0 : \beta_{mil} = \beta_{ti} = \beta_{ta} = 0$ and $H_0 : \delta_{mil} = \delta_{ti} = \delta_{ta} = 0$ while hypotheses of cointegration are $H_a : \alpha_{mil} \neq \alpha_{ti} \neq \alpha_{ta} \neq 0$, $H_a : \beta_{mil} \neq \beta_{ti} \neq \beta_{ta} \neq 0$ and $H_a : \delta_{mil} \neq \delta_{ti} \neq \delta_{ta} \neq 0$. The next turn is to compare the calculated F-statistic with critical bounds by Turner (2006) to analyze whether cointegration relation exists or not. If upper critical bound is less than computed F-statistic then decision is in favor of cointegration i.e. long run relationship exists. There is no cointegration between the variables if calculated F-statistic is lower than lower critical bound (LCB). If calculated F-statistic lies between lower and upper critical bounds then decision about cointegration is inconclusive. To examine the solidity of ARDL bounds testing approach to

cointegration, stability tests namely cumulative sum of recursive residual (CUSUM) and cumulative sum of squares of recursive residual (CUSUMQ) can be applied. These stability tests have been developed by Brown et al. (1975). Shahbaz et al. (2011) have used (CUSUM) and (CUSUMQ) to investigate the stability of estimated ARDL models for cointegration. In fact, the existence of cointegration between the variables through ARDL procedure does not signify the stability of estimated model. Therefore, (CUSUM) and (CUSUMQ) are worthwhile to conduct.

After the long-run relationship among the variables is established and the long-run and short-run estimates are obtained, the next objective is to conduct Granger-causality analysis. In case the series are integrated of the same order and are cointegrated, the Vector Error Correction Method (VECM) is most appropriate for causality analysis. In contrast to the unrestricted Vector Autoregression (VAR), the VECM is a restricted VAR, where the restriction imposed is the existence of long-run relationship among the variables. In an error correction model, all variables in the system are taken as endogenous in differenced form. In each equation the dependant variable depends on its own lags, the lags of the explanatory variables, the error correction term and on a random error term. The VECM in three variables case can be written as follows:

$$\Delta lmil_t = \alpha_1 + \sum_{i=1}^{p} \beta_{1i} \Delta lmil_{t-i} + \sum_{i=1}^{q} \beta_{1i} \Delta lta_{t-i} + \sum_{i=1}^{r} \beta_{1i} \Delta lti_{t-i} + \lambda_1 ECM_{t-1} + u_{1t} \quad (5)$$

$$\Delta lta_t = \alpha_2 + \sum_{i=1}^{p} \beta_{2i} \Delta lmil_{t-i} + \sum_{i=1}^{q} \beta_{2i} \Delta lta_{t-i} + \sum_{i=1}^{r} \beta_{2i} \Delta lti_{t-i} + \lambda_2 ECM_{t-1} + u_{2t} \quad (6)$$

$$\Delta lti_t = \alpha_2 + \sum_{i=1}^{p} \beta_{3i} \Delta lmil_{t-i} + \sum_{i=1}^{q} \beta_{3i} \Delta lti_{t-i} + \sum_{i=1}^{r} \beta_{3i} \Delta lta_{t-i} + \lambda_3 ECM_{t-1} + u_{3t} \quad (6)$$

where u_{it} are the serially uncorrelated random error terms. The ECM_{t-1} in the above equations represent the cointegrating vectors and λ_i is the adjustment coefficient. Since, in a VECM the variables on both sides of the above equations are stationary, above equations can be estimated using the Least Square (LS) method.

As discussed earlier, the VECM is preferred approach to detect causality among the variables in case of cointegrated series. Although cointegration indicates the presence of causality, yet the direction of causality amongst the variables is identified through VECM. Moreover, this method is also helpful in distinguishing between the short-run and long-run causality. Hence, using equations (5)-(7) of VECM, the causality can be examined in the following three ways:

i) The joint significance of the lagged terms of each of the variables on the right hand side in every equation is an evidence of the short-run causality running from those variables to the dependant variables in the respective equations. In case of more than one lag for each variable, the *F*-test is used for testing the joint significance of the lagged terms.

ii) The significance of coefficient of error correction term in each of the three equations is a measure of the long-run causality in that particular equation. The *t*-test is used for this purpose.

iii) Testing the joint significance of the error correction term and the lagged terms of various variables on the right hand side in each equation through Wald or F-test offers the joint

significance of the two sources of causality. This is also sometimes considered as a measure of "strong Granger causality" (Oh and Lee, 2004).

4.2 Data

After Afghanistan, Pakistan is the second country that faced the drastic consequences of the 9/11 event, in shape of terrorism. Being neighbor to Afghanistan became a curse for Pakistan as Taliban allegedly found hideouts in the bordering tribal areas of Pakistan after US attack on Afghanistan. At US insistence, the Pakistan Army launched an operation in the tribal areas resulting in huge collateral damage. In response, the terrorists started terrorist attacks of high intensities in the settled areas of Pakistan killing more than an estimated 32000 thousand people and injuring more than this number. Consequently, military budget also started rising. The estimated loss to the economy is estimated more than 60 billion dollars. Hence, in order to capture the true nature of the relationship among the three mentioned variables, the quarterly time series data is used for the period 2001:Q3-2010:Q2.

This underlying study uses three variables for analysis, namely, terrorism, intensity of terrorism, and military spending. Several studies in the conflict literature used number of terrorist incidents as measure of terrorism (see, for instance, Nasir *et al*. 2011) whereas some made use of the number of fatalities as proxy for terrorism (Feridun and Shahbaz, 2010). Assuming that both these measure have different degree of psychological impact, the present article brings into play both these proxies as two different variables. Consequently, in this analysis, the number of terrorist attacks occurred in a particular quarter is used as a measure of terrorism. On the other

hand, the number of causalities in these attacks is a proxy for intensities of terrorism. Data for both these variables have been taken from South Asia Terrorism Portal (SATP).

Data on military spending is obtained from the Pakistan Economic Survey (2010).[1] As rightly discussed in Feridun and Shahbaz (2010), the results obtained by using the overall defense spending data should be interpreted with care as there might exists some degree of measurement error. Unfortunately, for unrevealed reasons, the separate data on expenditures used for counter-terrorism measures is not made public. In such case, the data on overall military spending remain the only option to be used in the analysis.

5. Estimation Results and Discussion

Although the ARDL approach to cointegration is applicable irrespective of whether the variables are integrated of order zero or one, still pre-testing for non stationarity is worthwhile for the reason that the presence of a variable(s) with *I(2)* or higher can complicate the F-test, making the results unreliable (Ouattara, 2004). As a result, following Dickey and Fuller (1979) and Elliott et al. (1996), the augmented Dickey-Fuller (ADF) test and the modified Dickey-Fuller t-test (DF-GLS) are conducted in order to identify the order of integration of the variables. It is perceptible from the Table-1 that all the variables have unit root problem at level but are stationary at first difference. Hence, both tests confirmed that all the series are integrated of order one.

Table 1: The Results of Unit Toot Tests

Variables	ADF	DF-GLS
$\ln mil_t$	–1.9461 (3)	–2.2220 (3)
$\Delta \ln mil_t$	–5.7372 (1)***	–4.8513 (2)***
$\ln ti_t$	–0.1953 (2)	–1.7882 (3)
$\Delta \ln ti_t$	–3.9026 (3)**	–4.5276 (1)***
$\ln ta_t$	-1.5412 (1)	-1.5269 (1)
$\Delta \ln ta_t$	-4.7363 (1)***	-4.8804 (1)***

Note: The *** and ** denote significance at 1% and 5% level of significance respectively. The figure in the parenthesis is the optimal lag structure for ADF and DF-GLS tests.

Once the order of integration of variables is identified, the next step is to investigate whether or not, there is a long-run relationship among these variables. Nonetheless, before proceeding to testing of cointegration, an important step is to select the optimal lag length of the variables. Conventional methods are used for this purpose. According to these criteria, the optimal lag length is three. In a quarterly data, this lag length seems appropriate and logical. After the lag length is selected, the ARDL bound testing approach to cointegration is applied to investigate the long-run relationship among the variables. Table-2 reports the results of this test.

Table-2: ARDL Bounds Testing to Cointegration Analysis

Bounds Testing to Cointegration

Estimated Model	$lmil_t = f(ta_t, ti_t)$	$ti_t = f(lmil_t, ta_t)$	$ta_t = f(lmil_t, ti_t)$
Optimal Lag Length	(3, 3, 3)	(3,1, 2)	(3, 3, 3)
F-statistics	36.6371***	4.507	2.3060
	Critical values (T = 36)		
	Lower bounds $I(0)$	Upper bounds $I(1)$	
1 per cent level	7.397	8.926	
5 per cent level	5.296	6.504	
10 percent level	4.401	5.462	
Diagnostic tests			
R^2	0.9959	0.7068	0.5375
F-statistics	183.800 (0.0000)	3.7261 (0.0075)	0.8716 (0.6089)
J-B Normality test	0.2207 (0.8954)	1.2892 (0.5248)	1.6706 (0.4337)
Breusch-Godfrey Test	0.2191 (0.8070)	0.3718 (0.6956)	0.0282 (0.9723)
ARCH LM Test	0.2428 (0.6263)	0.0278 (0.8688)	0.0738 (0.7879)
Heteroskedasticity Test	1.1548 (0.4071)	0.8456 (0.6026)	0.7127 (0.7406)

Note: The *** and ** denote the significant at 1% and 5% levels of significance respectively. The optimal lag structure is determined by AIC.

As it is evident from the Table-2, all the three equations are tested keeping each variable as dependant variable respectively. The respective lag length of dependant and explanatory variables in each equation are also reported in the Table-2 below each equation. The results suggest that the null hypothesis of no long-run relationship between the variables is rejected at

Table-3: Long Run Results

Dependent Variable = $lmil_t$

Variable	**Coefficient**	**T-Statistic**
Constant	10.1984	69.0032***
lti_t	0.1382	3.1588***
lta_t	0.0674	1.4437
Diagnostic Tests		
	Test-Stats	***p*-Value**
$R-Squared$	0.5143	
$F-Statistics$	15.3543	0.0002
$\chi^2 NORMAL$	1.7729	0.4121
$\chi^2 SERIAL$	0.4273	0.5186
$\chi^2 ARCH$	1.1526	0.2918
$\chi^2 WHITE$	2.2349	0.1251
$\chi^2 REMSAY$	1.2483	0.2734

Note: $\chi^2 NORMAL$ refers to the Jarque–Bera statistic of the test for normal residuals, $\chi^2 SERIAL$ is the Breusch–Godfrey LM test statistic for serial correlation, $\chi^2 WHITE$ denotes the White's test statistic for homoskedasticity, and $\chi^2 ARCH$ is the Engle's test statistic for autoregressive conditional heteroskedasticity, and $\chi^2 REMSAY$ is model specification test.

1% when the terrorist attacks and terrorism insensitivity are treated as forcing variables. The calculated F-statistic is 36.63 while the value of upper bound is 8.926 at 1% level of significance, indicating one cointegrating vector between military spending, terrorist attacks and intensity of terrorism in Pakistan. The reason for using the critical bounds generated by Turner (2006) is that

they are better suited to small samples as compared to Pesaran et al. (2001) and Narayan (2005). Furthermore, following ARDL cointegration methodology equation-1 has been estimated to get the long-run estimates. These results are reported in Table 3.

The results in Table-3 show that the sign of terrorism intensity is positive and significant, whereas, the sign of terrorist attacks is positive but insignificant. This result portrays the fact that, in the long-run, it is the intensity of terrorism and not the terrorist attacks that plays a critical role in enhancing military expenditures. All the diagnostic tests given in the lower part of Table-3 confirm the validity of these results.

We now turn to the short-run results given in Table-4. The results depict that, even in the short-run, terrorism intensity is the major driver of increased defense spending. The positive and significant coefficients of the current and lagged terms of the terrorism intensity variable surface an interesting outcome that the intensity of terrorism prevails for a longer time (six months in the underlying case). Accordingly, military spending can increase within the same quarter in response to increased terrorism intensity. Moreover, based on these results, one may easily conclude that the intensity of terrorism confronted during the first quarter of the calendar year (January-March) does influence the budget decisions about military expenditure in the month of June. [2] The coefficient of the error-correction term is –0.97, suggesting a 97% disequilibrium adjustment within the first quarter. Thus, when faced by some shock, the speed of adjustment towards equilibrium is significantly fast in case of military expenditure equation. This high speed of adjustment is an evidence of the significance of intensity of terrorism.

Table-4: ECM Estimates of ARDL Model

Dependent Variable = $\Delta lmil_t$

Variable	Coefficient	t-Statistic
Constant	0.0057	0.1386
Δlti_t	0.0911	2.0160**
Δlti_{t-1}	0.0671	1.8112**
Δlta_t	0.0364	0.8728
ECM_{t-1}	-0.9782	-5.2532***
Diagnostic Tests		
	Statistics	***p*-value**
$R-Squared$	0.5516	
$F-Statistic$	7.9987	(0.0002)
BG LM test	2.2580	(0.1263)
ARCH LM test	1.1000	(0.3032)
White Heteroscedisticity	0.4048	(0.8034)
Ramsey RESET	0.1966	(0.6613)

Note: The *** and ** denote the significant at 1% and 5% levels of significance respectively. The optimal lag structure is determined by AIC.

The short run diagnostic tests such as LM test for serial correlation, normality of residual term, ARCH test, white heteroscedisticity and model specification test have been conducted. The results are reported in lower segment of Table-4. The empirical findings show that the short-run model seems to pass all diagnostic tests successfully. The evidence indicates no confirmation of serial correlation and the residual term is normally distributed. Furthermore, the model has

passed the Ramsey reset test which illustrates that the functional form of the model is well specified. The empirical results do not show evidence of autoregressive conditional heteroscedisticity and white heteroscedisticity in the short run model. Finally, the stability of model is also checked by applying cumulative sum of recursive residual (CUSUM) and cumulative sum of squares of recursive residual (CUSUMQ) techniques. It can be observed that the plots of both CUSUM and CUSUMQ statistics are well within the critical bounds of 5% which substantiate stability of all coefficients in the ECM model.

Figure 1: Plot of Cumulative Sum of Recursive Residuals

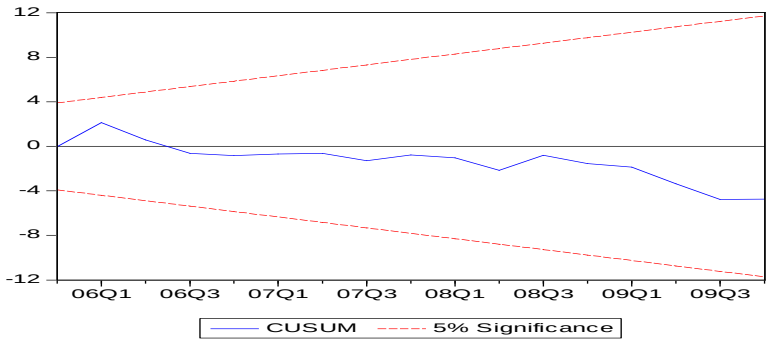
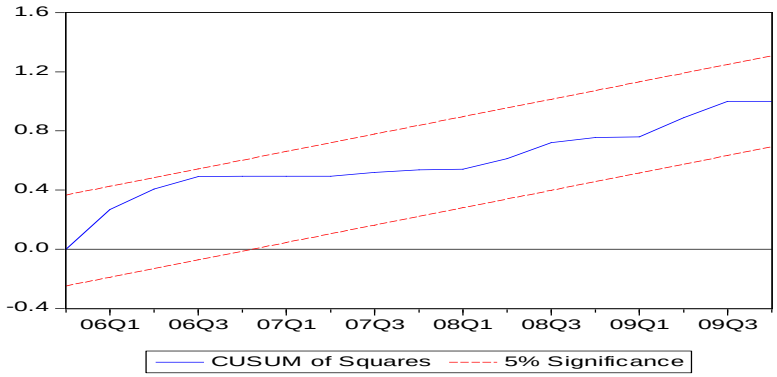


Figure 2: Plot of Cumulative Sum of Squares of Recursive Residuals



After the long-run and short-run dynamics is discussed, the next concern is to scrutinize the direction of causality amongst these variables. The application of ARDL bounds testing approach to cointegration only tests the existence of long relationship between the variable but does not suggest the direction of causality between them. It is documented by Morley (2006) that existence of long run association between the variables is necessary but not sufficient condition to reject the non-causality hypothesis. The empirical evidence reported in Table-2 confirms the cointegration between military spending, terrorism and intensity of terrorism but it is not sufficient to discern the direction of causality. Nonetheless, this existence of long run relationship between the variables does suggest that there must be causality at least in one direction. These reasons necessitate the use of Granger-causality analysis. The results of causality tests based on the VECM approach are shown in Table-5. The Table-5 has three major blocks separating the short-run effects, long-run effects represented by the error correction coefficients, and the joint short-run and long-run effects respectively. These results are analyzed in details in the following lines.

Table 5: Results of Causality Tests Based on VECM

	Short-run results (F-stats)			Long-run causality	Joint short-run and long-run results (F-stats)		
	$\Delta lmil_t$	Δlti_t	Δlta_t	ECM_{t-1} (t-stats)	$\Delta lmil_t, ECM_{t-1}$	$\Delta lti_t, ECM_{t-1}$	$\Delta lta_t, ECM_{t-1}$
$\Delta lmil_t$	-	2.68*	1.02	-5.25***	-	7.36***	8.26***
Δlti_t	0.69	-	1.67	-0.19	0.52	-	1.30
Δlta_t	0.21	0.43	-	0.60	0.18	0.45	-

Note: ECM_{t-1} represents error correction term. The *** and * denote significance at 1% and 10% levels of significance respectively.

The *F*-Statistics for short-run significance uncover the fact that military expenditure are caused only by terrorism intensity. These results give boost to the one reported in Table-5 where short-run coefficients of only terrorism intensity are significant. The results further illustrate that neither terrorism nor its intensity is caused by military spending. These results are interesting but not surprising as most of the studies in defence literature found the same results. Lastly, neither terrorism nor its intensity causes each other in the short-run. Based on these results, we may conclude that, in the short-run, there is unidirectional causality running from terrorism intensity to military spending.

Turning now to error correction results, it is observed that deviation from the long-run equilibrium is corrected only by military spending, while terrorism and its intensity appear to be exogenous. This makes public the reality that any changes in the latter two variables disturbing the long-run equilibrium are corrected by counter-balancing adjustment in the military spending variable. Therefore, one can conclude that military spending are caused by terrorism and its intensity but these two variables are not caused by the military spending in the long-run.

In the third section of Table-5, the *F*-statistics indicate the significance of combined short-run and long-run effects. In first equation, error correction term and terrorism are jointly significant. The same is also true for intensity of terrorism. Conversely, none of the joint terms in the rest of the two equations are significant which further confirms the exogeneity of these two variables. Overall, the results of the causality analysis are in conformity with the cointegration, long-run and short-run results.

These results combined with those present in Tables-3 and 4 raise two very important points that call for attention. The first point is regarding the causality running from terrorism intensity to military spending. It is obvious from the combined results that it is actually the intensity of terrorism and not the number of terrorist incidents that has more psychological effects on the masses and, therefore, becomes a convincing factor for high military spending. This result is in line with our hypothesis. As mentioned in the theoretical section, a terrorist incident without causing any casualty has no more eminent effects on the people of Pakistan. They have become used to it and, as a result, are less terrorized by such incidents. The high frequency of terrorist attacks has made it a day-to-day matter for them. More importantly, such incidents no more make a headline "News" in print and electronic media. Nevertheless, a terrorist attack intensive in terms of high fatalities does spread terror in general public. The recent military operation in the Swat district of Khyber Pakhtunkhwa is a good example of how terrorism intensity can raise military expenditure, as soon after the operation the military budget has been increased without any opposition.[3] Since, the number of terrorist incidents and the intensity of terrorism neither have the same impact on nor do they have the same meaning for people anymore, ergo, one should be very careful in using these variables interchangeably in the models.

The second point is related to the absence of causality running from military spending to both terrorism and its intensity. It is worth motioning that these results highlight the failure of enhanced military spending not only in controlling the terrorist attacks but also in curtailing their intensities. This failure in the latter case is even more worrying, pointing to the fact that the terrorists have not only moved in the country easily but also been able to carry powerful explosives with them with same ease. Subsequently, the conventional notion of that terrorism

can be eliminated or at least reduced through higher military spending is not an empirical fact in Pakistan.

6. Conclusion and Policy Recommendations

The prime objective of the underlying study was to investigate the causality between military spending, terrorism, and intensity of terrorism. Making use of ARDL approach to cointegration and the VECM for Granger-causality, the study finds that terrorism intensity is the major determinant military spending and causes it to increase. On the other hand, neither terrorism nor its intensity is influenced by military spending. In the following lines, we conclude the results and then make appropriate policy recommendations on basis of these results.

It is rightly said by Feridun and Shahbaz (2010) that military measures alone are not enough and there should be social, political and economic measures to fight against terrorism. However, these are long term solutions which basically originate from the literature on determinants of terrorism that calls for eradication of root causes of violence. It is, therefore, important to investigate the reasons responsible for the failure of military measures in curtailing terrorism. Three points are very important in this regard. Firstly, the policy makers need to understand that military is trained specifically for the protection of boundaries from foreign invaders. Conversely, for internal security, civil agencies such as police and Federal Investigative Agency (FIA) are established. Moreover, in contrast to military personnel, the police is spread throughout the country and is an important source of law enforcement at the lowest possible level in the sense that an SHO in a particular area knows all the information about each household in the that area. What is wrong with the current counter-terrorism policy is the extreme reliance on military

measures to combat terrorism on one hand, and the negligence of the role of civil agencies on the other. Moreover, most of the terrorist attacks are originated and executed internally and the terrorist network exists throughout the country. Therefore, given the specific nature of terrorism and keeping in view the structural hierarchies of the law enforcement agencies in Pakistan, we believe that instead of looking to pure military measures and thereby allocating all the resources to them, concrete measures should be taken to strengthen the civil intelligence agencies. These should include training of the personnel, provision of advanced weapons as well as equipments for detection of explosive materials; and better coordination between the military, civil intelligence and law enforcement agencies. Given the resource constraint, this may not be an inappropriate policy to cut military budget to allocate funds to civil intelligence agencies to save their personnel from becoming easy victims of terrorist attacks as they are at the forefront in this war-on-terror. Seen in this perspective, the decision to increase military budget between 13%-18% in the coming fiscal year in the name of war-on- terror should be reviewed in the budget discussions in the parliament in June. On the other side, the budgets of civil intelligence agencies should be increased substantially.

The second problem with this current counter-terrorism policy is the unequal provision of security. In Pakistan, few people including parliamentarians and even the high ranked military and civil officials are provided security at the cost of rest of the people. This has a counterproductive effect on security, as not enough personnel are available to inspect the various suspicious areas thereby providing easy hideouts for terrorists. As a result, a common sense of insecurity prevails among the masses thereby resulting in adverse psychological consequences

like lowering the tolerance level in the society. So, these personal should be released from the security of VIPs and should be used for inspections purposes.

Lastly, the current measures for restriction of terrorists' movements in the form of inserting cameras and making check posts at roads within the cities are not only inappropriate but also counter-productive. Capturing terrorists with explosive materials on these check posts, having not even a single vehicle-scanner, appears to be a joke. Absence of scanners, even at the entrance points in important cities such as Islamabad, is worrisome. In contrast, these check posts, rather than being able to provide security, create blockage on the roads, increasing the probability of terrorist attacks in these congested areas. Such attacks have been observed in the Peshawar district of Khyber Pakhtunkhwa. Hence, as a productive measure, these check posts should be equipped with advanced scanning facilities.

Footnotes

1. The data on military spending in quarter frequency is hardly available. We followed Arby and Batool (2007) to transform annual series into quarter frequency for the period of 2001-2009.
2. The fiscal year in Pakistan starts from the month of July.
3. In Swat, the terrorism intensity was extremely high not only because of high fatalities but also due to the type of terrorist attacks, including suicide bombings and beheading the people. Its intensity was felt even in Islamabad and therefore, when the operation was conducted in Swat, it was welcomed by the people.

References

1. Abadie, A. and Gardeazabal, J. (2003) The economic costs of conflict: a case study of the Basque Country. *American Economic Review* **93**(1), pp: 113-132.
2. Alesina, A. and Perotti, R. (1993) Income distribution, political instability, and investment. NBER Working Paper No. 4486 National Bureau of Economic Research, Cambridge, MA.
3. Alesina, A. and Perotti, R. (1996) Income distribution, political instability, and investment. *European Economic Review* **40**(6), pp: 1203-1228.
4. Alesina, A., Ozler, S., Roubini, N. and Swagel, P. (1996) Political instability and economic growth. *Journal of Economic Growth* **1**(2)**,** pp: 189-212.
5. Arby, M. F and Batool. I., (2007) Estimating quarterly gross fixed capital formation. SBP working paper series no. 17.
6. Arora, V. and Bayoumi, T. (1993) Economic benefits of reducing military expenditure, Annex II in World Economic Outlook. Washington, DC: International Monetary Fund.
7. Arshad, S., (2007) *India and Pakistan 2007*. BBC 2007 Feature.
8. Arunatilake, N., Jayasuriya, S. and Kelegama, S. (2001) The economic cost of the war in Sri Lanka. Research Studies:Macroeconomic Policy and Planning Series 13 Colombo: Institute of Policy Studies of Sri Lanka.
9. Barro, R.J. (1991) Economic growth in a cross section of countries. *Quarterly Journal of Economics* **106**(6), pp: 407-443.

10. Benoit, E. (1978) Growth and defense in developing countries. *Economic Development and Cultural Change* **26**(2), pp: 271-280.
11. Blomberg, S.B., Hess, G. and Orphanides, A. (2004) The macroeconomic consequences of terrorism. *Journal of Monetary Economics* **51**(5), pp: 1007-1032.
12. Brophy-Baermann, B. and Conybeare, J.A.C. (1994) Retaliating against terrorism: rational expectations and the optimality of rules versus discretion. *American Journal of Political Science* **38**(1), pp: 196-210.
13. Brown, R. L., Durbin, J and Evans, J.M. (1975) Techniques for testing the constancy of regression relations over time. *Journal of the Royal Statistical Society* **37**(2), pp: 149-163.
14. Carroll, D. (2006) A guns vs. taxes? A look at how defense spending affects U.S. federal tax policy. *Public Budgeting & Finance* **26**(2), pp: 59-78.
15. Cauley, J. and Im, E.I. (1988) Intervention policy analysis of skyjackings and other terrorist incidents. *American Economic Review Papers and Proceedings* **78**(2), pp: 27-31.
16. Dickey, D. A and Fuller, W. A (1981) Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root. *Econometrica* **49**(4), pp: 1057-1072.
17. Dickey, D.A and Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association* **74** (336), pp: 427-431.
18. Elliot, G., Rothenberg, T. J., Stock, J. H. (1996) Efficient Tests for an Autoregressive Unit Root. *Econometrica* **64**(4), pp. 813-836.
19. Enders, W. and Sandler, T. (1993) The effectiveness of anti-terrorism policies: a vector-autoregression-intervention analysis. *American Political Science Review* **87**(4), pp: 829-844.

20. Engle, R. F and Granger, C. W. J. (1987) Cointegration and error correction representation: estimation and testing. *Econometrica* **55**(2), pp: 251-276.
21. Feridun, M and Shahbaz, M. (2010) Fighting terrorism: are military measures effective? Empirical evidence from Turkey. *Defence and Peace Economics* **21**(2), 193-205.
22. Gupta, S., Clements, B., Bhattacharya, R. and Chakravarti, S. (2004) Fiscal consequences of armed conflict and terrorism in low- and middle-income countries. *European Journal of Political Economy* **20**(2), pp: 403-421.
23. Jehl. D., (1993) Pakistan is facing terrorist listing, New York Times, April 25, 1993.
24. Johansen, S., (1992) Cointegration in partial systems and the efficiency of single-equation analysis. *Journal of Econometrics* 52(3), pp: 389-402.
25. Knight, M., Loayza, N. and Villanueva, D. (1996) The peace dividend: military spending cuts and economic growth. *IMF Staff Papers* **43**(1), pp: 1-37.
26. Kronstadt. K. A., (2007) Pakistan and terrorism: A summary, Specialist in Asian Affairs Foreign Affairs, Defense, and Trade Division.
27. Landes, W. M., (1978) An economic study of U.S. aircraft hijacking, 1961–1976. *Journal of Law & Economics* **21**(1), pp: 1-31.
28. Lis, P. (2007) Government's role in fighting terrorism. *Finance and Economics* **3**(2), pp:1-38.
29. Lum, C., Kennedy, L.W. and Sherley, A.J. (2006) The effectiveness of counter-terrorism strategies. *A Campbell Systematic Review* 2(4), pp: 1-49.
30. Morley, B. (2006) Causality between economic growth and immigration: an ARDL bounds testing approach. *Economics Letters* **90**(1), pp: 72-76.

31. Narayan, P. N. (2005) The saving and investment nexus for China: evidence from cointegration tests. *Applied Economics* **37**(17), pp: 1979-1990.
32. Nasir, M., Amanat, A., and Rehman, F. Ur. (2011) Determinants of terrorism: A panel data analysis of selected South Asian countries. *Singapore Economic Review* (forthcoming).
33. Oh, W., Lee, K., (2004) Causal relationship between energy consumption and GDP: the case of Korea 1970–1999. *Energy Economics* **26**(1), pp: 51-59.
34. Omand, D. (2005) Countering international terrorism: the use of strategy. *Survival* **47**(4), pp: 107–116.
35. Ouattara, B. (2004) Foreign Aid and Fiscal Policy in Senegal, University of Manchester, Manchester, UK.
36. Pakistan Economic Survey, (2009) The Finance Division, Ministry of Finance, Pakistan.
37. Pesaran, M. H, Shin Y., (1999) An autoregressive distributed lag modeling approach to cointegration analysis. Chapter 11 in Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium, Strom S. (ed.). Cambridge University Press: Cambridge.
38. Pesaran, M. H., Shin, Y., Smith, R., (2001) Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, **16**(3), pp: 289-326.
39. Richardson Jr., J.M. and Samarasinghe, de A.S.W.R. (1991) Measuring the economic dimensions of Sri Lanka's ethnic conflict. In: Economic Dimensions of Ethnic Conflict, edited by A. de Samarasinghe and R. Coughlan. New York: St. Martin's Press.
40. Rodrik, D. (1999) Where did all the growth go? External shocks, social conflict, and growth collapses. *Journal of Economic Growth* **4**(4), pp: 385-412.

41. Rousse. S, (2004) Excerpts: Gender and space, Dawn, August 15, 2004

42. Sandler, T. (2005) Collective versus unilateral responses to terrorism. *Public Choice* **124** (1-2), pp: 75-93.

43. Seddighi. H. R, A. Lawler, A. V. Katos., (2006) *Applied Econometrics: A Practical Approach*. Routledge, London and New York.

44. Sezgin, S. (1997) Country survey x: defence spending in Turkey. *Defence and Peace Economics* **8**(4), pp: 381-409.

45. Sezgin, S. (2000) The defense-growth relation: evidence from Greece. In The Economics of Regional Security: NATO, the Mediterranean and South Africa, edited by J. Brauer and K. Hartley. Amsterdam: Harwood Academic Publishers, 113–137.

46. Sezgin, S. (2001) An empirical analysis of Turkey's defence-growth relationship with a multi equation model (1956–1994). *Defence and Peace Economics* **12**(1), pp: 69-86.

47. Shahbaz, M., Afza, T and Shahbaz, M. S. (2011) Does Defence Spending Impede Economic Growth? Cointegration and Causality Analysis for Pakistan. *Defence and Peace Economics (forthcoming).*

48. Silke, A. (2005) Fire of lolaus: the role of state countermeasures in causing terrorism and what needs to be done. In Root Causes Of Terrorism? Myths, Reality and Ways Forward, edited by T. Bjorgo. Oxford, UK: Routledge.Terör Faturasi: 100 milyar dolar (2006) Radikal Gazetesi. Retrieved 3 January 2008 from http://www.radikal.com.tr/ haber.php?haberno=203451&tarih=04/11/2006.

49. Turner, P., 2006. Response surfaces for an F-test for cointegration. *Applied Economics Letters* **13**(8), pp: 479-482.

50. Venieris, Y. P. and Gupta, D. K. (1986) Income distribution and socio political instability as determinants of savings: a cross-sectional model. *Journal of Political Economy* **94**(4), pp: 873-883.