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Interlinkages among Terrorism, Macroeconomic Instability, Political Instability, and Economic Growth in Pakistan

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Abstract

This study attempts to establish the relationship between three types of instabilities and economic growth. Political instability, macroeconomic instability, terrorism, and economic growth are analyzed for the period of 1970 to 2019 in Pakistan. The study constructs the indices of the above-mentioned variables by adding some new variables. Results show that terrorism, political instability, macroeconomic instability, and GDP per capita have long-run associations. GDP per capita and political instability is positively related to terrorism. It indicates that political instable environment paves the way for terrorists to achieve their targets in Pakistan. However, the positive association of GDP per capita to terrorism is due to uneven income distribution pattern. It stimulates deprived groups to become a part of violent activities. Furthermore, results show that macroeconomic performance of a country has no significant effect on terrorist activities but persistent poor performance increases the probability of terrorism. Therefore, in the long-run, macroeconomic instability has positive influence on terrorism. Causality relationships indicate no link between political instability and macroeconomic instability. However, terrorism causes both political and macroeconomic instability in Pakistan.

***Keywords*:** Political Instability, Economic Growth, Macroeconomic Instability, Terrorism

1. INTRODUCTION

Since independence Pakistan is facing an unfavourable environment regarding economic, political, and social stability. Several factors are responsible for the country's weak economic and political condition. Pakistan is sharing the largest part of the border with India and Afghanistan. Throughout the history, Pakistan has been in clash with India. Similarly, Afghanistan is also considered a war-ravaged country. As a result, cross-border terrorism is the main concern for the governments of both countries.

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Various factors, such as, religious, geographical, demographic, psychological, political and socio-economic explain terrorist activities in Pakistan [Ismail and Amjad (2014)]. Specifically, GDP, inflation, poverty, inequality and unemployment are the main contributing factors [Bukhari and Masih (2016)]. These internal factors have a more pronounced effect in creating macroeconomic instability. However, some external factors, such as, terms of trade and financial shocks can also destabilize the economy. This instability can be connected to terrorism. Political instability is another important source of terrorism that slows down the development process of a country. Political instability arises due to rapid change of government, absence of rule of laws, military coups, frequent structural changes, revolutionary activities and political assassinations. It hinders the investment and production decisions that directly affect the economic growth. It is necessary to integrate society and maintain peace and harmony within the state. This will be possible only under a politically stable environment. Economic development and social well-being can be achieved through political stability that is helpful in building a state. It is impossible to achieve the goal of development without political stability (Naqvi, *et al*. (2017).

It becomes difficult for any country to grow with poor law and order, political unrest, and weak financial sector. Furthermore, the incapability of successive governments to initiate long-run and wide-ranging policies, reforms, and weak institutional base can increase the non-routine collective behaviour that is a form of terrorism. In Pakistan, there are multiple factors behind political instability. It includes state instability, border conflict with India, internal macroeconomic mismanagement, economic reforms of the 1990s, nuclear tests, and regime change. Domestic and foreign debt has increased due to targeting of internal macroeconomic variables. Furthermore, the economic reforms of 1990s were not successful for economic growth because of high corruption, lack of political consensus, and implementation of policies. However, the decision regarding nuclear tests of 1998 lead to severe economic sanctions by the world. This increases the level of debt with foreign exchange reserve and in these circumstances the military took over in 1999, resulting in regime change.

There are various direct and indirect channels that can affect terrorist activities in a country. The study of Ezcurra and Palacios (2016) showed that inequality leads to terrorism in the panel of 48 countries. Okafor (2015) showed negative relationship between macroeconomic indicators and economic growth in ECOWAS. In case of Pakistan, the studies of Shahzad, *et al.* (2013) and Estrada, *et al*. (2015) showed adverse effects of terrorism on economic growth. Political instability and inflation are also negatively related to growth in Pakistan [Najaf and Najaf (2016); Ahmed and Pulok (2013)]. There is a wide array of literature on the terrorism and economic growth (Khan, *et al.,* 2016)

political instability and economic growth (Ahmed and Pulok, 2013) macroeconomic instability and economic growth (Ali and Rehman, 2015). However, the existing literature seems to be silent in examining the combined relationship among political instability, macroeconomic instability, terrorism, and economic growth. Therefore, the goal of the current study is to investigate the association among economic growth, political instability, macroeconomic instability, and terrorism.

This study is significantly helpful in tracing the sources of instability likely arising due to political factors, macroeconomic factors, and terrorist activities that can hinder the economic growth. The uncertain economic, political, and social environments increase the level of unemployment, poverty, inflation, political unrest, and terrorist activities in a country. Therefore, it adversely affects the economic growth. Pakistan is suffering from internal and external problems such as trade deficit, budget deficit, exchange rate volatility, lack of political power, and cross-border clashes; the reasons of instability in Pakistan. Hence, there is a need to fill this gap by investigating the combined linkages between political instability, macroeconomic instability, terrorism, and economic growth in case of Pakistan.

The present study explores the causal linkages among political instability, macroeconomic instability, GDP per capita, and terrorism in Pakistan. It determines the direction and signs of linkages among these variables. This study is helpful in determining whether the political setup and macroeconomic performance are interconnected. Furthermore, it also investigates how these instabilities are linked with terrorist activities and economic growth. The study also highlights the internal structural economic and political problems that can contribute to terrorist activities.

Three aspects of this study constitute important differences to previous studies. First, macroeconomic instability is explicitly considered as a reason of terrorism along with political instability. Furthermore, the indices of terrorism, political instability, and macroeconomic instability are constructed by incorporating new variables. Secondly, we have developed a theoretical framework that links the three types of instabilities and economic growth. This framework provides interlinkages among political instability, macroeconomic instability, terrorism, and economic growth. The third difference is in context of policy suggestions that deviate from current policies prescription.

The study proceeds by discussing literature review on terrorism, macroeconomic stability, political instability, and economic growth in Section 2. Theoretical and analytical framework is presented in Section 3. Data and construction of variables are discussed in Section 4. Results are provided in Section 5. The last section summarizes the study with some policy suggestions.

2. LITERATURE REVIEW

Literature has highlighted various potential sources of terrorism. Broadly, we can classify the sources of terrorism into two categories i.e. macroeconomic factors and political factors.

The studies of Ali and Li (2016); Bukhari and Masih (2016); Ismail and Amjad (2014); Saeed, *et al.* (2014); Malik and Zaman (2013); Khayyam, *et al.* (2018 & 2019) and Shahbaz (2013) examined the role of macroeconomic variables such as inflation, population, poverty, income inequality, unemployment, and GDP per capita on terrorism in Pakistan. Results indicate positive association between socio-economic variables and terrorism. However, contradictory results are found in the relationship between GDP per capita and terrorism. In this context, Bukhari and Masih (2016); Ali and Li (2016); Shahbaz (2013) and Caruso and Schneider (2011) reported a positive relationship between terrorism and GDP per capita. Whereas, Khan, *et al.* (2016); Shahzad, *et al.* (2016); Hyder, *et al.* (2015) and Blomberg, *et al.* (2004), showed an inverse relationship between these two variables.

Several studies have been conducted on the association between macroeconomic factors and terrorism, yet literature seems to be silent on providing the studies that establish the link between macroeconomic instability and terrorism. However, few studies examined the relationship between inflation and terrorism but single variable of inflation is not enough for the explanation of macroeconomic situation of an economy [Behera and Mishra (2016); Rasul, *et al.* (2016); Azam (2001); Bruno and Easterly (1998)]. Hence, for the very first time, Ismihan (2003) constructed macroeconomic instability index by incorporating inflation, external debt, public deficit, and exchange rate. The present study extends the macroeconomic instability index by adding new variables and attempts to establish its link to terrorism.

Political instability has different aspects that include instability within the political government, accumulation of civil protest, politically motivated violent behaviour and instability of the political regime. Limited literature is reported on the relationship of political instability and terrorism. Fahey (2010); Krueger and Laitin (2008) and Useem (1998) showed that political instability increases terrorism. Li (2005) examined the relationship of regime durability to international terrorism. Results show that less durable regimes tend to attract terrorism.

The studies of Abadie (2006), and Tavares and Wacziarg (2001) used democracy as a proxy to define political situation. These studies highlighted democracy as the cause of terrorism. Similarly, Lai (2007) used civil wars as an indication for state failure that increases terrorism. Existing studies have

used different indictors for political instability. In this study we have constructed the index of political instability. Furthermore, lack of systematic and empirical analysis in connection with terrorism and political instability motivated us to establish a link between the stated variables.

Some studies have examined the causality relation among political instability, macroeconomic instability, terrorism, and economic growth. The studies of Bahera and Mishra (2016); Shahzad, *et al.* (2016); Shahbaz (2013); Shahbaz, *et al.* (2013); Malik and Zaman (2013); Ahmad (2013) and Nawaz, *et al.* (2012) showed one-way causality from political instability to economic growth, from macroeconomic instability to economic growth, and from terrorism to economic growth. While, other found bidirectional causality [Afolabi and Bakar (2016); Ismail and Amjad (2014); Nurudeen, *et al.* (2014)].

The study of Ismail and Amjad (2014) showed unidirectional causality from unemployment to terrorism while, the causality between inflation and terrorism is bidirectional. Nurudeen, *et al.* (2015) examined the casual association among political instability, economic growth, and corruption in the West African States. The study found unidirectional causality from political instability to economic growth in short run. Afolabi and Bakar (2016) examined causal links among economic growth, political volatility, foreign direct investment (FDI), and trade in Nigeria. The results show two-way causality between FDI and economic growth. However, causality between political volatility, trade balances, FDI, and economic growth is unidirectional. The study of Campos and Nugent (2002) showed no causality between economic growth and socio-political instability.

Shahzad, *et al.* (2013) analyzed the casual link of terrorism and economic growth in Pakistan. The results show the causality among trade openness, terrorism, and capital is bidirectional. However, causality between terrorism and GDP per capita is unidirectional. Contradictory results are found on the direction of causality among macroeconomic variables, political variables, economic growth, and terrorism. Therefore, in this study we construct the composite index of macroeconomic instability, political instability, and terrorism. These comprehensive indices are used to examine their interlinkages.

3. THEORETICAL FRAMEWORK

Theoretically, factors such as terrorism, political instability, macroeconomic instability, and economic growth may cause each other [Bahera and Mishra (2016); Shahzad, *et al.* (2016)]. The present study deviates

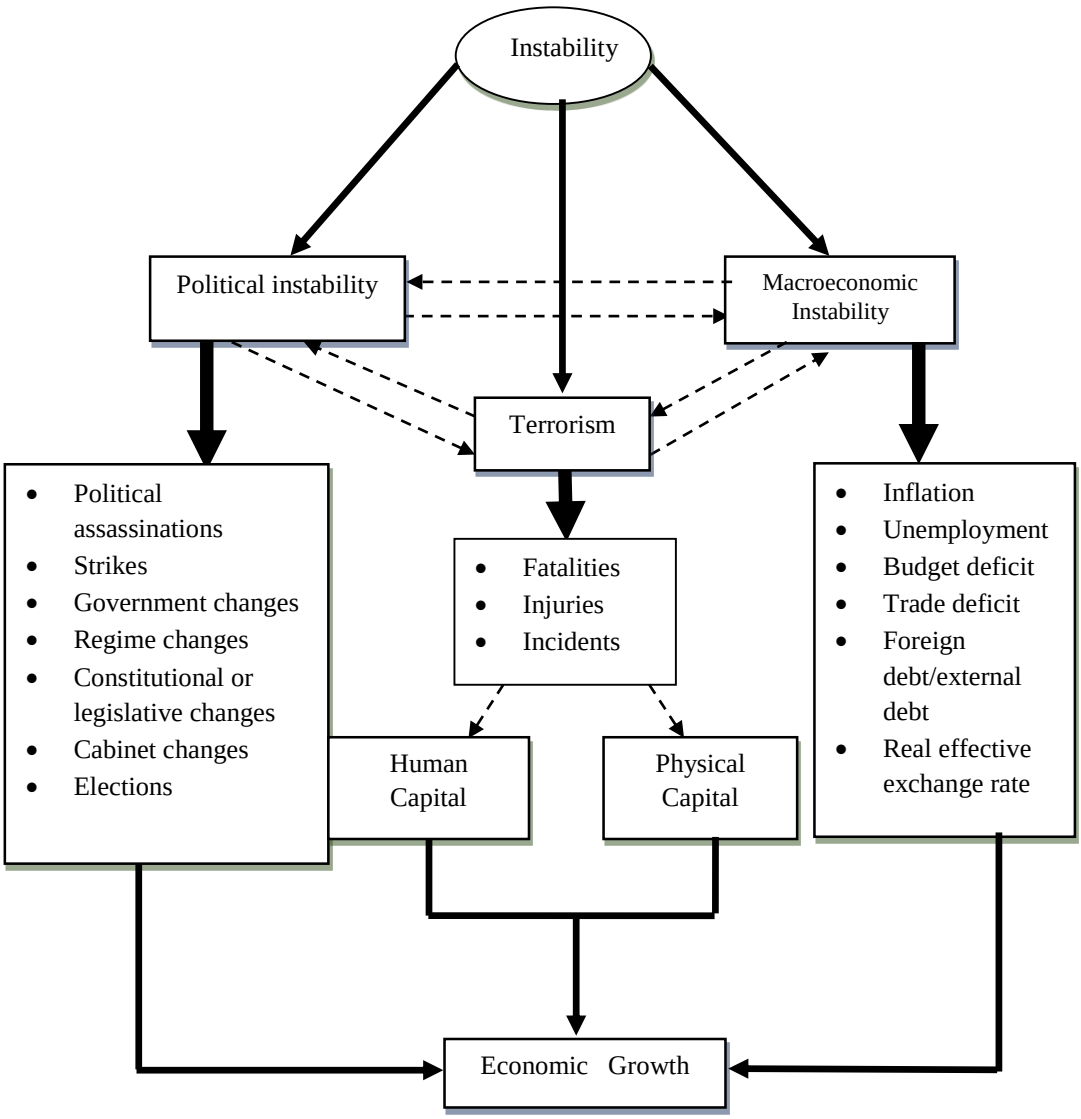
from previous literature in providing the link between these types of instabilities and economic growth. Terrorism, political instability, macroeconomic instability, and economic growth are examined to trace their linkages in Pakistan. These linkages are presented in Figure 1. It shows that there are three types of instabilities i.e. political instability, macroeconomic instability, and terrorism that can affect economic growth [Ismail and Amjad, (2014); Abadie (2006)]. Conversely, economic growth can also affect these instabilities directly or indirectly [Shahbaz (2013)]. These three types of instabilities can be measured by using any one of the indicators mentioned in the Figure 1 or by using a composite index based on two or more variables. Hence, political instability can be measured with the help of political assassination, cabinet changes, constitutional or legislative changes, regime changes, government changes, and strikes. Likewise, macroeconomic instability can be defined through inflation, unemployment, external/foreign debt, budget deficit, trade deficit, and real effective exchange rate. Terrorist attacks, injuries, and fatalities can be used as a proxy of terrorism. It directly affects economic growth through destruction of human and physical capital. These three categories of terrorism directly affect economic growth and there also exists one-way or two-way causality between these instabilities that may or may not have significant effect on economic growth.

Hence, political instability, macroeconomic instability, terrorism, and economic growth appear to cause each other. For instance, variations in macroeconomic variables not only have direct effects on economic growth but they also create political and social instabilities that further affects growth adversely. This channel can be explained by considering one of the macroeconomic variables i.e. higher unemployment. It is an indication that economy is operating below its capacity, resulting in low level of output and income. Therefore, it directly affects the economic growth. Moreover, higher unemployment also generates social and political problems. Deprived section of the society has higher tendencies to indulge in criminal and terrorist activities, and hence it destabilizes the economy by creating social and political unrest. Likewise, inflation among other variables also has direct and indirect adverse effects on economic growth. Given the problems discussed above, we hypothesize the following:

a. Terrorism, political instability, and macroeconomic instability do not cause economic growth.
b. Terrorism, political instability, and economic growth do not cause macroeconomic instability.
c. Terrorism, macroeconomic instability, and economic growth do not cause political instability.

d. Political instability, macroeconomic instability, and economic growth do not cause terrorism.

Figure 1. Linkages among Three Types of the Instability and Economic Growth



Source: Developed by Authors.

3.1. Model

Following and extending the framework proposed by Shahbaz (2013), three models are formulated to establish the link among political instability, macroeconomic instability, terrorism, and economic growth in Pakistan.

$$Model\ 1:\ lnTI_t = \varphi_1 + \varphi_2 lnPII_t + \varphi_3 lnMII_t + \varphi_4 lnGDP_t + \mu_t \quad \ldots (1)$$

$$Model\ 2:\ lnTI_t = \varphi_1 + \varphi_2 lnMII_t + \varphi_3 lnGDP_t + \mu_t \quad \ldots (2)$$

$$Model\ 3:\ lnTI_t = \varphi_1 + \varphi_2 lnPII_t + \varphi_3 lnGDP_t + \mu_t \quad \ldots (3)$$

where, GDP_t, PII_t, MII_t and TI_t indicate GDP per capita, political instability index, the macroeconomic instability index and terrorism index respectively. Model 1 shows the link among three types of instabilities and GDP per capita. It highlights whether instability causes each other and GDP per capita. Model 2 and model 3 are constructed to check the robustness of results. Moreover, these two models show how sensitive are the results with alternative specifications. Therefore, model 2 is developed in connection with terrorism, macroeconomic instability, and GDP per capita. This is the restricted model and the specification excludes political instability. Finally, model 3 shows the association among terrorism, political instability, and GDP per capita. The specification of model 3 has not taken into account the macroeconomic instability. All models are taken in log form.

ARDL technique is applied to inspect the linkages among macroeconomic instability, political instability, terrorism, and economic growth. Pesaran, *et al.* (2001) developed the ARDL test for co-integration. The ARDL bound test is preferred over conventional co-integration approaches due to some advantages. It can easily be applied without knowing the order of intergration of variables. According to Zhang and Yue (2002) the conventional approaches such as the Engle and Granger (1987) and Johansen and Juselius (1990) methods do not give better results in small data set. However, ADRL bound test provides better results when applied to a small data sample. Moreover, this method offers unbiased estimates and valid t-statistics regardless of the endogeneity of some regressors [Harris and Sollis (2003); Jalil and Ma (2008)]. This is because of the suitable and appropriate lag selection, hence, residual correlation is eliminated and the endogeneity problem is also alleviated [Ali, *et al.* (2016)]. The ARDL bound test is applied to check the presence of co-integration for model 1, presented given below:

$$\Delta\, \ell n\, TER_t = \gamma_0 + \gamma_{PII}\, \ell n\, PII_{t-1} + \gamma_{MII}\, \ell nMII_{t-1} + \gamma_{TER}\, \ell nTER_{t-1} + \gamma_{GDP}\, \ell nGDP_{t-1} +$$

$$\sum_{i=1}^{p} \gamma_i \ \Delta \ell nPII_{t-i} + \sum_{j=1}^{q} \gamma_j \ \Delta \ell nMII_{t-j} + \sum_{k=1}^{r} \gamma_k \ \Delta \ell nTER_{t-k} + \sum_{\ell=1}^{s} \gamma_l$$

$$\Delta \ell nGDP_{t-l} + \mu_t \qquad \ldots (4)$$

$$\Delta \ \ell n \ PII_t = \alpha_0 + \alpha_{PII} \ \ell nPII_{t-1} + \alpha_{MII} \ \ell nMII_{t-1} + \alpha_{TER} \ \ell nTER_{t-1} + \alpha_{GDP}$$

$$\ell nGDP_{t-1} +$$

$$\sum_{i=1}^{p} \alpha_i \ \Delta \ell nPII_{t-i} + \sum_{j=1}^{q} \alpha_j \ \Delta \ell nMII_{t-j} + \sum_{k=1}^{r} \alpha_k \ \Delta \ell nTER_{t-k} + \sum_{l=1}^{s} \alpha_l$$

$$\Delta \ell nGDP_{t-l} + \mu_t \qquad \ldots (5)$$

$$\Delta \ \ell n \ MII_t = \beta_0 + \beta_{PII} \ \ell n \ PII_{t-1} + \beta_{MII} \ \ell nMII_{t-1} + \beta_{TER} \ \ell nTER_{t-1} + \beta_{GDP}$$

$$\ell nGDP_{t-1} +$$

$$\sum_{i=1}^{p} \beta_i \ \Delta \ell nPII_{t-i} + \sum_{j=1}^{q} \beta_j \ \Delta \ell nMII_{t-j} + \sum_{k=1}^{r} \beta_k \ \Delta \ell nTER_{t-k} + \sum_{l=1}^{s} \beta_l$$

$$\Delta \ell nGDP_{t-l} + \mu_t \qquad \ldots (6)$$

$$\Delta \ \ell n \ GDP_t = \delta_0 + \delta_{PII} \ \ell n \ PII_{t-1} + \delta_{MII} \ \ell nMII_{t-1} + \delta_{TER} \ \ell nTER_{t-1} + \delta_{GDP}$$

$$\ell nGDP_{t-1} +$$

$$\sum_{i=1}^{p} \delta_i \ \Delta \ell nPII_{t-i} + \sum_{j=1}^{q} \delta_j \ \Delta \ell nMII_{t-j} + \sum_{k=1}^{r} \delta_k \ \Delta \ell nTER_{t-k} + \sum_{\ell=1}^{s} \delta_l$$

$$\Delta \ell nGDP_{t-l} + \mu_t \qquad \ldots (7)$$

In order to examine the presence of co-integration, Pesaran, *et al.* (2001) suggested the upper and lower critical bounds in which calculated F-value is compared to the tabulated critical bounds. The null hypothesis of no co-integration in equation 4, 5, 6 and 7 is $H_0: \gamma_{\Pi} = \gamma_{PII} = \gamma_{MII} = \gamma_{GDP} = 0$, $H_0: \alpha_{\Pi} = \alpha_{PII} = \alpha_{MII} = \alpha_{GDP} = 0$, $H_0: \beta_{\Pi} = \beta_{PII} = \beta_{MII} = \beta_{GDP} = 0$, and $H_0: \delta_{\Pi} = \delta_{PII} = \delta_{MII} = \delta_{GDP} = 0$. The alternative hypothesis of co-integration $H_1:$ at least one γ, α, β and δ is not equal to zero. We reject the null hypothesis if F-value is greater than the upper critical bound (UCB). We do not reject the null hypothesis if lower critical bound (LCB) higher than the calculated F-value. When F-value is lies within lower and upper critical bounds, the results will be indecisive regarding co-integration.

4. DATA SOURCES AND CONSTRUCTION OF VARIABLES

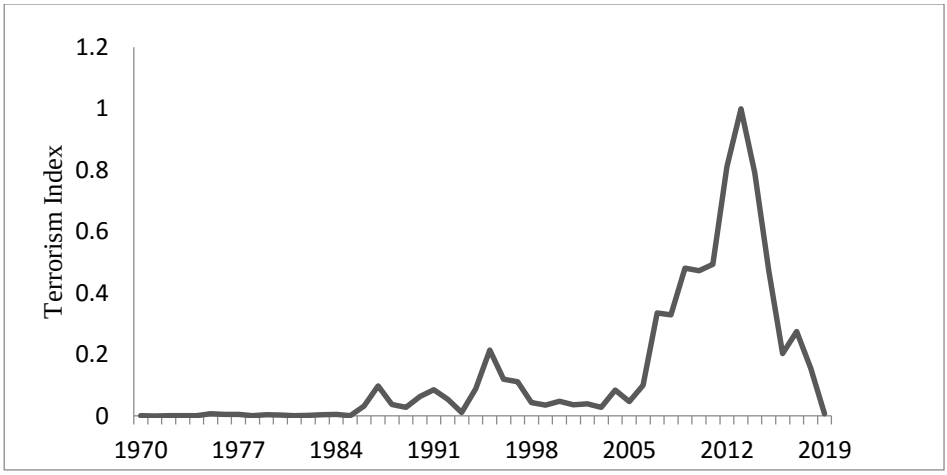
4.1. Terrorism Index (TI)

In this study terrorism index is constructed through three variables namely as number of incidents, number of injuries, and number of fatalities. Data on terrorist attack and fatalities are collected from global terrorism database (GTD) and number of incidents are taken from RAND database. Each variable is normalized to eliminate scale biasness and then weights are derived by applying statistical technique of principal component analysis (PCA). This multivariate statistical technique assigns different weights to variables through calculating factor scores. It reduces multidimensional data to lower dimensions and at the same time it keeps most of the information. In constructing index, it is more appropriate to use different weights to each variable of the index rather than assigning equal weight [Greco, *et al.* (2018)]. Therefore, the terrorism index is constructed as follows by applying PCA,

$$TI = W_1\left(\frac{Incident_t - Incident_{Min}}{Incident_{Max} - Incident_{Min}}\right) + W_2\left(\frac{Injuries_t - Injuries_{Min}}{Injuries_{Max} - Injuries_{Min}}\right) + W_3\left(\frac{Fatalities_t - Fatalities_{Min}}{Fatalities_{Max} - Fatalities_{Min}}\right) \quad \ldots(8)$$

where, W_1, W_2 and W_3 are the weights assigned to each variable through principal component analysis. Historical trend of terrorism index in Pakistan is presented in Figure 2. It shows that the incidence of terrorism is increasing since 1985 and in 2013 terrorism index reaches its highest value. Pakistan Army started Zarb-e-Azb operation in 2014 against Tehrik-e-Taliban, Lashkar-e-Jhangvi, Al-Qaeda, and Haqqani network. These are some of the organized militant groups involved in terrorist activities in Pakistan. The operation broke the momentum of terrorist activities, as many terrorists and their leaders were killed in this successful operation. It has resulted in decline of terrorist activities since 2014. The State Bank of Pakistan reported a total cost of $118.3 billion in combating terrorism.

Figure 2. Trend of Terrorism Index



Source: Author's Calculation Based on Constructed Index.

4.2. Macroeconomic Instability Index (MII)

Following Ali and Bibi (2016); Ali and Rehman (2015) and Sameti, *et al.* (2012), macroeconomic instability index is extended by incorporating six variables. These variables include inflation, unemployment rate, budget deficit, trade balance, foreign/external debt, and real effective exchange rate. To measure the macroeconomic instability these six variables are used for Pakistan for the period 1970 to 2019. Construction of macroeconomic instability index is proposed below:

$$MII = V_1\left(\frac{Inflation_t - Inflation_{Min}}{Inflation_{Max} - Inflation_{Min}}\right) + V_2\left(\frac{Uuemployment_t - Unemployment_{Min}}{Unemployment_{Max} - Unemployment_{Min}}\right) + V_3\left(\frac{TB_t - TB_{Min}}{TB_{Max} - TB_{Min}}\right) + V_4\left(\frac{BD_t - BD_{Min}}{BD_{Max} - BD_{Min}}\right) + V_5\left(\frac{ED_t - ED_{Min}}{ED_{Max} - ED_{Min}}\right) + V_6\left(\frac{REER_t - REER_{Min}}{REER_{Max} - REER_{Min}}\right) \quad \ldots (9)$$

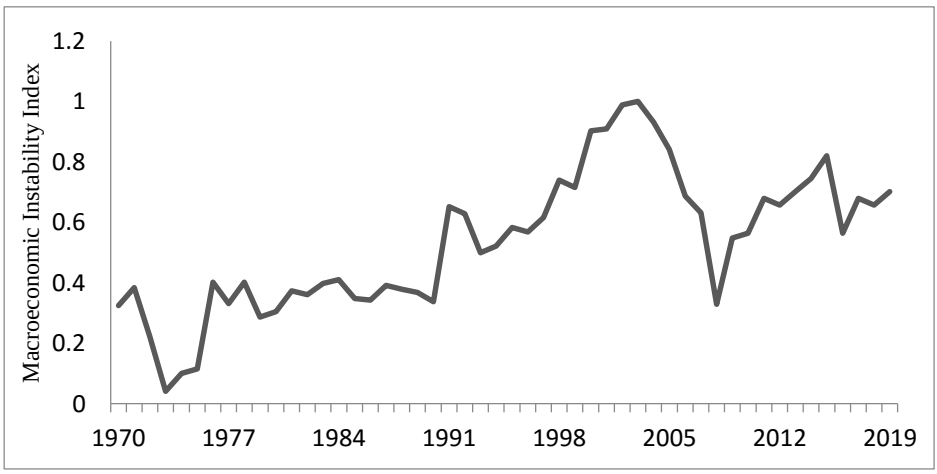
Each variable is normalized by following the traditional method and weights are derived through PCA. V_1 , V_2 , V_3 , V_4 , V_5 and V_6 are the weights of each variable. TB_t, BD_t , ED_t and $REER_t$ shows trade balance, budget deficit, external debt, and real effective exchange rate respectively.

Data on inflation (% of CPI), unemployment (% of Labour force), external debt (% of GNI), and trade balance (% of GDP) are collected from

World Bank database. Budget deficit (% of GDP) is calculated by taking a difference of total revenue to total expenditure and data are taken from different issues of Economic Survey of Pakistan. Data of REER are extracted from Bruegel database.

Economic history reveals government's inability for establishing sustainable resources for public finance. Moreover, resource mobilization is not effective, highlighting the weakness of fiscal policy. Consequently, the result of fiscal imbalance reflects in budget deficit. Low rate of domestic saving and non-availability of concessional loans in1990s restricted the policy makers for restructuring the economy [Mahmood, *et al.* (2008)]. Pakistan relied on foreign aid and loans for the financing of current account, instead of focusing on exports. The economic mangers failed to implement the policies of equitable distribution that resulted in weak performance of other macroeconomic indicators such as unemployment and inflation among others. Figure 3 shows poor macroeconomic performance from 1970 to 2019, except for a few years. Macroeconomic instability arises due to the improper implication of fiscal and monetary policies. Co-ordination failure is also the leading factor towards macroeconomic instability. Performance of Pakistan's economy on macroeconomic stability remained questionable throughout the history of 70 years. The indicators such as budget deficit, trade deficit, unemployment, and inflation have shown poor performance.

Figure 3. Trend of macroeconomic Instability



Source: Author's Calculation Based on Constructed Index.

4.3. Political Instability Index (PII)

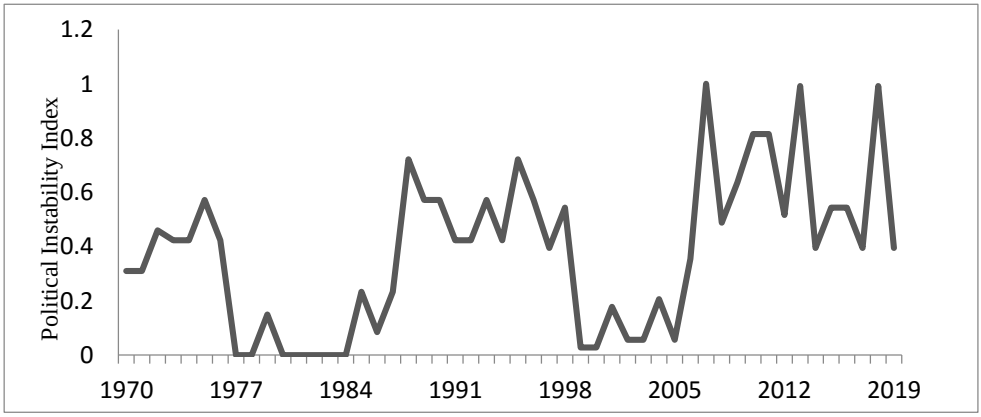
Political instability index is constructed with the help of two variables. It includes polity 2 and political assassinations that measure the political instability. Polity 2 is used to measure the regime changes and institutional

changes. However, political assassination is defined as the number of death (assassination) of political leaders. Data are collected from Polity IV dataset and history of Pakistan.

$$PII = \alpha_1 \left(\frac{Assassination_t - Assassination_{Min}}{Assassination_{Max} - Assassination_{Min}} \right) + \alpha_2 \left(\frac{Polity2_t - Polity2_{Min}}{Polity2_{Max} - Polity2_{Min}} \right) \quad \ldots (10)$$

where, α_1 and α_2 are the equal weights assigned to assassination and polity 2. Figure 4 shows that political instability remained high in three periods. First period starts from 1970 to 1976, in this period Zulfikar Ali Bhutto and General Muhammad Zia-ul-Haq were in government. Second period is from 1987 to 1998 in which President General Zia dissolved the National Assembly and Junejo cabinet. General Zia was killed in a plane crash and Mir Murtaza Bhutto was assassinated in 1996. Political instability index appears to be the highest over the period of 2007 to 2019. In this period, president Musharraf dismissed Iftikhar Muhammad Chaudhry, the Chief Justice of Pakistan, and the assassination of Benazir Bhutto in 2007. In 2009, terrorists attack on the Sri Lankan cricket team raised several questions on the security and law and order situation of Pakistan. Mr. Salman Taseer, the governor of Punjab, was assassinated by his own body guard in 2011. Long March of 2014 by Pakistan Tehrih-e-Insaf (PTI) and Pakistan Awami Tehrik (PAT) contributed towards political instability in the country.

Figure 4. Trend of Political Instability



4.4. GDP per Capita

GDP per capita is the gross domestic product divided by population in the midyear. World Bank defines GDP as the summation of gross value by all the resident producer of the economy in which taxes are included on the product but not subsidy. Moreover, depreciation of natural resources is not included in the calculation of GDP. Data on GDP per capita are collected from World Bank database. *(www.data.worldbank.org).*

5. RESULTS AND DISCUSSIONS

In this section results are discussed regarding the connection among macroeconomic instability, economic growth, political instability, and terrorism by using ARDL bound test approach to co-integration.

5.1. Empirical Results of Model 1

As a preliminary, the stationarity of data is check by applying Augmented Dickey Fuller (ADF) unit root. Results are given in Table 1.

Table 1. Results of ADF Test

Variables	t-statistics	
	At Level	At First Difference
GDP per Capita	-0.423	-5.802***
MII	-2.287	-7.602***
PII	-2.867	-4.047*
TI	-1.891	-8.148*

Note: The symbol *** and * indicates the level of significance at 1% and 10% respectively.

The results show that economic growth, macroeconomic instability, political instability, and terrorism are stationary at first difference as we are unable to accept the null hypothesis of unit root test. It is essential to establish the optimal lag of the model before applying the test of co-integration. Therefore, lag selection criteria provide a guideline as to how many lag to be included in the model.

Table 2. Results of Lag Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	18.495	NA	6.18e-06	-0.742	-0.497	-0.681
1	171.895	260.081*	1.18e-08*	-6.934*	-6.197*	-6.611*
2	179.115	19.987	1.46e-08	-6.815	-5.445	-6.209
3	196.184	25.924	1.45e-08	-6.884	-4.603	-6.096
4	216.229	14.839	1.95e-08	-6.696	-3.803	-6.165

Table 2 presents the results of lag order selection criteria. It shows that lag one is selected by all the criteria. Therefore, the optimal lag length of model 1 is one in Pakistan. To find out the association among the variables, ARDL bound test to co-integration is applied and the results are reported in Table 3.

Table 3 shows the result of ARDL bound testing to co-integration in Panel I while, Panel II shows the diagnostic test. In Panel-I, the calculated value of F-statistics is greater than upper critical bound when terrorism and macroeconomic instability are used as dependent variables. Therefore, the value of F-statistic is significant at 1% and 10% level of significance. This implies a long-run link among the political instability, macroeconomic instability, economic growth, and terrorism in Pakistan during the period of 1970 to 2019. This study uses critical bound generated by Pesaran *et al*. (2001). Diagnostic tests are presented in Panel-II. LM serial test shows no evidence of correlation. ARCH and White test of heteroskedasticity show no problem of heteroskedasticity.

Table 3. Results of Bound Test

Panel I: Bound test				
Dependent Variables	Terrorism	Macroeconomic Instability	Political Instability	Economic Growth
Optimal lag	(1,1,1,1)	(1,1,1,1)	(1,1,1,1)	(1,1,1,1)
Calculated F	10.108***	4.27*	2.996	1.55
Conclusion	Co-integration	Co-integration	No Co-integration	No Co-integration
Significance level	Lower bounds I(0)	Upper bounds I(1)		
1%	4.385	5.615		
5%	3.219	4.378		
10%	2.711	3.800		
Panel II: Diagnostic tests				
R^2	0.657	0.401	0.405	0.315
$AdjR^2$	0.510	0.311	0.217	0.114
χ^2 LM test	0.083(0.811)	3.985(0.154)	0.703(0.401)	4.719(0.129)
χ^2 ARCH test	0.395(0.550)	0.296(0.582)	2.414(0.124)	0.702(0.423)
χ^2 White test	3.719(0.880)	9.451(0.318)	4.523(0.810)	8.132(0.431)

Note: The symbol ***, and * indicates level of significance at 1% and 10% respectively. Probability value is given in brackets.

Johansen test is also applied to check the robustness of long-run association among political instability, macroeconomic instability, economic growth, and terrorism. All the variables are integrated of order one, therefore; there is no harm in applying Johansen test.

Table 4. Results of Johansen Test

Hypothesis	Eigenvalue	Trace Statistics	C.V	Prob.	Max-Statistic	C.V	Prob.
None	0.555	73.916	47.856	0.000	35.657	27.584	0.003
At most 1	0.450	38.259	29.797	0.004	26.332	21.131	0.008
At most 2	0.223	11.926	15.494	0.160	11.146	14.264	0.147
At most 3	0.017	0.780	3.841	0.377	0.780	3.841	0.377

Trace test indicate 2 co integrating equations at the 0.05 levels.

Results of Johansen test are presented in Table 4. Trace test and λ max test indicate two co-integrating vectors, validating the long-run link among political instability, macroeconomic instability, terrorism, and economic growth at 5% level of significance.

The estimates of long run are given in Table 5. The coefficient of GDP per capita is positive and significant, implying that terrorism is positively linked with GDP per capita. If GDP per capita increases by 1%, it will increase terrorism by 6.56%. This finding of present study is consistent with Bukhari and Masih (2016) and Shahbaz (2013). Uneven income distribution in the society is the main reason for the positive association between GDP per capita and terrorism in Pakistan. Unjust pattern of income distribution is considered as one of the potential sources of terrorism. Generally, poor segment of the society is considered as easy target for external forces to indulge them in terrorist activities.

Table 5. Estimates of Long Run

Panel I: Dependent Variable:$\Delta lnTI_t$			
Variable	Coefficient	Std. Error	t-Statistic
C	-21.011***	2.601	-8.078
$\Delta lnMII_t$	0.213	0.412	0.516
$\Delta lnGDP_t$	6.561***	0.910	7.209
$\Delta lnPII_t$	0.511*	0.191	2.675
Panel II: short run diagnostic tests			
R^2	0.807		
$AdjR^2$	0.824		
χ^2 LM test	0.003 (0.941)		
χ^2 ARCH test	0.203 (0.657)		
χ^2 White test	0.914 (0.819)		

Note: The symbol *** and * represent level of significance at 1% and 10% respectively. Probability values are given in brakets.

It is a general belief that this segment can be used to destabilize domestic economy through terrorism by providing monetary benefits. Coefficient of political instability is also positive and significant. If political instability increases by 1%, it increases terrorism by 0.51%. Political instability

is another source of terrorism in Pakistan according to findings of this study. Political instability, in terms of assassination and change in regime, is linked to terrorist activities in the long run. Hence, unstable political environment helps violent factors to plan terrorist activities in the long run.

Long run estimate highlights the internal structure problem of Pakistan that fuels terrorist activities. Higher economic growth along with higher income inequality and political instability increases terrorism in Pakistan over the period of 1970 to 2019. Effect of macroeconomic instability on terrorism is positive but statistically insignificant. In panel-II, long run diagnostic test are applied. Breusch-Gogfrey LM test is applied to check serial correlation, which implies no evidence of serial correlation. Moreover, White and ARCH test is also applied to diagnose the heteroskedasticity in the model. Findings of the tests show that model is free from the problem of heteroskedasticity.

Table 6. Estimates of Short Run

Panel I: Dependent Variable:$\Delta lnTI_t$			
Variable	Coefficient	Std. Error	t-Statistic
C	0.041	0.101	0.410
$\Delta lnMII_t$	0.191	0.419	0.455
$\Delta lnGDP_t$	2.417	8.511	0.283
$\Delta lnPII_t$	0.234*	0.115	2.034
ECT_{t-1}	-0.909***	0.202	-4.509
Panel II: short run diagnostic tests			
R^2	0.361		
$AdjR^2$	0.312		
χ^2 LM test	0.650 (0.430)		
χ^2 ARCH test	0.310 (0.512)		
χ^2 White test	6.923 (0.941)		

Note: The symbol *** and * represent level of significance at 1%and 10% respectively. Probalbilities values are given in brakets.

The short run results are provided in Table 6. Coefficient of macroeconomic instability and GDP per capita is positive but statistically insignificant, while political instability is significant at 10% level of significance. The variable of political instability is positively linked with terrorism; it means that if political instability increases by 1%, it will increase terrorism by 0.23%. ECT tells the long run speed of adjustment. Generally, ECT lies between 0 to -1 and results indicate that ECT is -0.90 which is statistically significant at 1% level of significance. Speed of adjustment is 90.90%, suggesting that the error correction term converges more rapidly towards the equilibrium. The diagnostic tests for short run are given in panel-

II. It shows that the problem of heteroskedasticity and serial correlation does not exist in the model.

The results of CUSUM and CUSUM sq stability test for ARDL model are presented in Appendix 1. These tests are used to examine the stability of long run and short run estimate. These stability tests are suggested by Pesaran and Shin (1998). Results indicate that model is stable at 5% level of significance as the plot of CUSUM and CUSUM sq lies within the critical boundaries.

5.2. Robust Check

Table 7 shows robust results of ARDL bound testing to co-integration of model 2 and model 3. Results of diagnostic test are presented in panel-II. It shows that both the models are free from the heteroskedasticity problem and residual are not serial correlated.

Table 7. Results of Bound Testing

Panel I: Bounds Tests		
	Model 2	Model 3
Dependent variable	Terrorism	Terrorism
Optimal lag	(1,1,1)	(1,1,1)
Calculated F	11.51***	11.13***
Coclusion	Co-integration	Co-integration
Significance Level	Lower bounds I(0)	Upper bounds I(1)
1%	5.288	6.309
5%	3.793	4.855
10%	3.182	4.126
Panel II: Diagnostic tests		
R^2	0.531	0.514
$AdjR^2$	0.451	0.421
χ^2 LM test	0.191 (0.650)	0.988(0.332)
χ^2 ARCH test	1.229 (0.2657)	0.314(0.604)
χ^2 White test	12.515 (0.982)	11.617(0.985)

Note: The symbol *** presents significance level at 1%. Probability values are given in brackets.

Estimates of long run are presented in Table 8. It indicates robust results expected for the variable of macroeconomic instability. Coefficient of macroeconomic instability is positive and statistically significant, implying a positive relationship between macroeconomic instability and terrorism. If macroeconomic instability increases by 1%, it will increase terrorism by 0.39%. Positive association between macroeconomic instability and terrorism in Pakistan is due to instability of its components i.e. increase in inflation and unemployment.

Table 8. Estimates of Long Run

Panel I: Dependent Variable:$\Delta lnTI_t$				
	Model 2		Model 3	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
C	-23.876***	-9.834	-21.374***	-13.659
$\Delta lnMII_t$	0.388*	1.912	----	----
$\Delta lnPII_t$	-----	----	0.499**	3.094
$\Delta lnGDP_t$	7.680***	9.516	6.763***	12.969
Panel II: short run diagnostic tests				
R^2	0.794		0.831	
$AdjR^2$	0.784		0.819	
χ^2 LM test	3.255 (0.171)		0.025 (0.873)	
χ^2 ARCH test	0.046 (0.829)		0.129(0.718)	
χ^2 White test	0.854 (0.652)		4.193(0.521)	

Note: The symbol ***, ** and * represent level of significance at 1%, 5% and 10% respectively. Probability values are given in brackets.

Higher price level decreases the purchasing power of individuals' particularly poor segment of society. In these circumstances, the opportunity cost of life decreases and it fuels terrorist activities. Unemployment is also a contributing factor in increasing terrorism. The magnitude of the coefficients has slightly increased in Table 8 in comparison to Table 5. It is due to the restricted specifications; however, the difference is not significant and is interpreted as almost similar in the direction except for the variable of macroeconomic instability. Results of the diagnostic test are in panel-II and reveal no issue of serial correlation and heteroskedasticity in model 2 and 3.

Estimates of short run analysis are stated in Table 9. They show robust results for both models. Short run diagnostic test is provided in panel-II and indicate that the model is free from the issues of serial correlation and heteroskedasticity.

Table 10 presents the result of pair-wise Granger causality test. It shows unidirectional causality from economic growth to macroeconomic instability and terrorism. Higher economic growth causes terrorism due to uneven income distribution pattern, which in turn creates macroeconomic instability in Pakistan. Also, unidirectional causality exists from terrorism to political and macroeconomic instability. This shows that terrorism not only destabilizes the economic performance of the economy but it also causes political unrest. Hence, it can be concluded that terrorism creates instability in different sectors. The unidirectional causality exists from political instability to economic growth at 5% significance level. However, no causality exists between political instability and macroeconomic instability.

Table 9. Estimates of Short Run

Panel I: Dependent Variable:$\Delta lnTI_t$				
	Model 2		Model 3	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
C	0.033	0.308	0.041	0.412
$\Delta lnMII_t$	0.185	0.479	----	----
$\Delta lnPII_t$	----	----	0.223*	1.974
$\Delta lnGDP_t$	3.351	0.382	2.259	0.267
ECT_{t-1}	-0.884***	-4.371	-0.904***	-4.536
Panel II: short run diagnostic tests				
R^2	0.334		0.351	
$AdjR^2$	0.290		0.313	
χ^2 LM test	0.491 (0.483)		1.379 (0.243)	
χ^2 ARCH test	0.898 (0.341)		0.253 (0.621)	
χ^2 White test	3.406 (0.954)		4.484 (0.887)	
CUSUM	Stable		Stable	
CUSUMsq.	Stable		Stable	

Note: The symbol ***, and * represent level of significance at 1% and 10% respectively. Probability values are given in brackets.

Table 10. Results of Pair-wise Granger Causality Test

Null hypothesis	F-Stat	Conclusion
Macroeconomic instability does not cause economic growth	0.625	Unidirectional causality from economic growth to Macroeconomic instability
Economic growth does not cause macroeconomic instability	7.218***	
Political instability does not cause economic growth	5.510**	Unidirectional causality from political instability to economic growth
Economic growth does not cause political instability	1.168	
Terrorism does not cause economic growth	0.031	Unidirectional causality from economic growth to terrorism
Economic growth does not cause terrorism	19.381***	
Political instability does not cause macroeconomic instability	0.084	No causality between political instability and macroeconomic instability
Macroeconomic instability does not cause political instability	0.181	
Terrorism does not cause macroeconomic instability	6.361***	Unidirectional causality from terrorism to macroeconomic instability
Macroeconomic instability does not cause terrorism	0.481	
Terrorism does not cause political instability	2.722*	Unidirectional causality from terrorism to political instability
Political instability does not cause terrorism	0.632	

Note: The symbol ***, **, and * indicate the level of significance at 1%, 5% and 10% respectively.

6. CONCLUSION

This study investigates the empirical association among political instability, economic growth, macroeconomic instability, and terrorism in Pakistan by using annual data for the period 1970 to 2019. This study determines the directions among three types of instabilities and economic growth. ARDL bound testing approach to co-integration and other econometric methods such as Johansen test of co-integration and pair-wise Granger causality test are applied. Pakistan is facing several internal structure problems including political unrest, poor law and order condition, terrorist attacks, and inconsistent economic policies that directly affect economic growth.

The results show the existence of co-integration among political instability, macroeconomic instability, terrorism, and economic growth in Pakistan. GDP per capita, political instability, and macroeconomic instability have positive influence on terrorism. The main reason of the positive relationship between economic growth and terrorism is the unequal distribution of income. Few are benefited at the expense of majority of the population. It leads towards economic deprivation and poverty; as a result, terrorism has increased in Pakistan. Terrorism and macroeconomic instability also indicate positive relationship. The rationale behind this phenomenon is the high level of unemployment and inflation rate. These factors push the individuals towards terrorist activities. The positive association between political instability and terrorism indicate that political instability increases terrorist attacks. Another reason behind the positive association between political instability and terrorism is that political instability reduces the volume of investment, raises unemployment, and inflation which increases the terrorist activities through the reduction in purchasing power of individuals. Some individuals of the society indulge into terrorist activities to obtain monetary benefits for their families because they cannot fulfill their basics needs.

Pair-wise Granger Causality test results reveal unidirectional causality from economic growth to macroeconomic instability and terrorism, from terrorism to political instability and macroeconomic instability, and from political instability to economic growth.

The results show that all the three types of instability are interconnected. Instability on political side or instability in macroeconomic indicators, both increase terrorism in Pakistan. Likewise, terrorism also contributes in generating instability on political and macroeconomic sides. Therefore, well-targeted policies are required to lessen the impact of instabilities on growth.

It is therefore concluded from the study that government needs to mitigate all the three types of instability in order to have favourable effects on

economic growth. In this regard, long- term planning is required to control the harmful effects on GDP due to terrorism, and macroeconomic and political instabilities.

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Appendix1

Figure I. CUSUM Stability Test

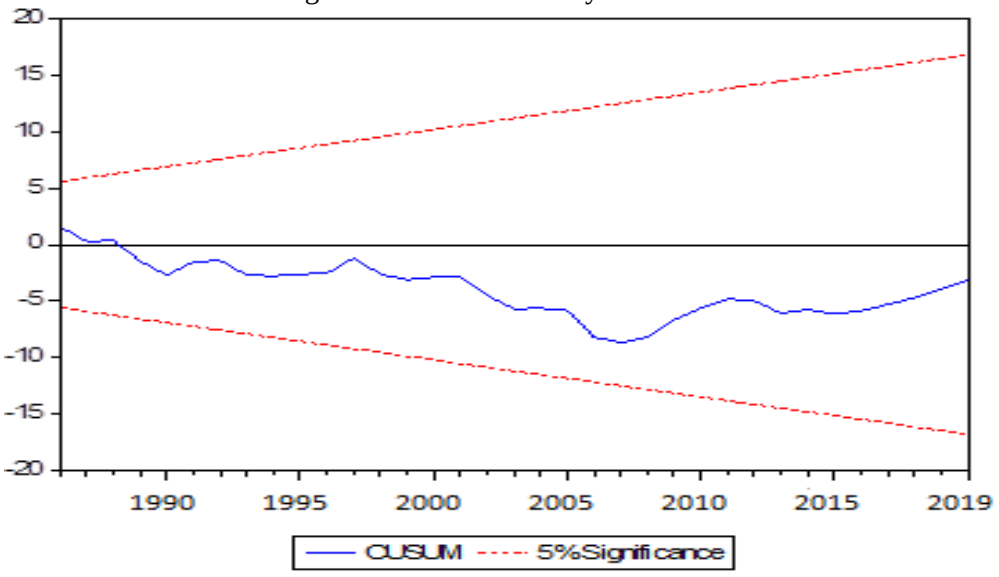

Figure II. CUSUMsq Stability Test