The Impact of Terrorism on the Economic Growth: An Empirical Study of Pakistan[1]

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Abstract

Terrorism has negatively affected growth and development and has forced an intense economic burden on Pakistan. The general loss of self-assurance in economy and high defense and security expenditures leads to economic distortions which further affects the economic growth and instability in the country. This study analyzes empirically the long and short-run impact of terrorism on the economic growth of Pakistan during 1980-2016 and suggests suitable policy measures to control the problems arising from the terrorism. The results of Auto Regressive Distributed Lag (ARDL) approach to co-integration reveals a long-term relationship among economic growth and independent variables during this period. The ARDL results reveal that terrorism is one of the main hurdles in the way of economic growth in Pakistan. Trade openness, human capital is the supporting factors in boosting economic growth. The results of Error Correction Mechanism (ECM) indicate that even in the short-run terrorism can deteriorate the economic growth of Pakistan. The negative impact of terrorism on the economy is proved beyond doubt from the findings of the study, thus, the study suggest that government should focus more on the basic causes of domestic terrorism and should emphasize on the awareness programs. The government should also focus on the reduction in the income inequality among the citizens as it is considered one of the key reasons to upsurge the terrorist activities among the deprived classes in the society.

Keywords: Terrorism; Economic Growth; Human Capital; Trade Openness; ARDL

Introduction

Terrorism, terrorists, and terror are a burning social evil, and perhaps one of the biggest problems facing the world today. Ganor (2005) defines terrorism as "the deliberate use of violence aimed against civilians to achieve political ends." 'Terrorism is a misdemeanor and crime that consistently victimizes the innocent people' (Michael, 2007). The people are not mostly the ultimate targets; they are only a means to achieve their hidden objectives. Terrorism is a state of mind rather than activity; it is a tree,

and extremism provides balance food to grow the tree properly (Michael, 2007). According to Global Terrorism Index (2015), the most adversely affected countries from terrorism are: Iraq; Afghanistan; Nigeria; Pakistan; Syria; India; Yemen; Somalia; Libya; and Thailand. During the last 15 years more than 61,000 terrorist incidents have occurred which claimed over 140,000 lives all over the world. The number of deaths in 2014 increased by 80% (14,574) as compared to the previous year (Global Terrorism Index, 2015).

The global economic costs of terrorist activities have also significantly increased and reached its highest level (i.e. US$ 52.9 billion) during 2014, which were 61% more than the preceding year ($32.9 billion). The five countries (Iraq, Nigeria, Afghanistan, Pakistan and Syria) with the larger number of terrorist attacks have more than 16 million Internally Displaced Persons and refugees in 2014 (Global Terrorism Index, 2015).

Terrorism has a significant impact on the economic growth of the countries with largest number of terrorist events. The above ten most terrorism-affected countries have had their economic growth negatively affected by terrorism while countries with less terrorism has had minor impact on their economy. Terrorism-hit countries have experienced a decrease in the GDP growth rates between 0.51% and 0.8% and from 1.3 % to 2 % in investment.

Terrorism and Economic Growth in Pakistan
Pakistan took strict actions against terrorists, especially after the 9/11 incident it has supported anti-terrorist movements all over the world on all international platforms (Michael, 2007). According to Global Terrorism Index (2015), Pakistan has experienced an increase in the terrorist activities in the last 15 years. It has averaged 153 deaths per year from 1998 to 2006; from 2007 to 2014, the number per year deaths increased to 1,592 on average. Though Pakistan experienced 7 % reduction in the terrorist incidents and 25% reduction in deaths from terrorism from 2013 to 2014, it is still fourth in the world with in the number of deaths due to terrorism. In 2014, 1,821 terrorist incidents occurred killing 1,760; injuring 2,836; and damaging 2,752 properties.

In term of losses, 48,000 men were killed in various terrorist activities including suicide bombing, shelling, blasts etc. in Pakistan (*The Express Tribune*, 2013, July 22). Similarly, according to a report in the *The Dawn* (2014, Feb 23), Pakistan has incurred a loss of US $ 78 billion to its economy and infrastructure in the last 13 years. Although it is difficult to come up with precise figures showing the actual loss Pakistan has faced, yet the reported figures are really very huge

The terrorist incident of Army Public School in Peshawar, Pakistan on Dec 16, 2014 is included in one of the twenty most fatal terrorist attacks in the world in 2014 (Global Terrorism Index, 2015). Peshawar is the fourth deadliest city in the world (Global

Terrorism Index, 2015). The costs of terrorism to Pakistan are rapidly increasing not only because of increasing number of terrorist attacks but also due to rising intensity and extensive nature of these terrorist activities.

Problem Statement

In theoretical framework, terrorism has negative impact on the economy of Pakistan. Terrorism destroys human and physical assets of a country and increases the costs of security; insurance; and military expenditure. Moreover, the larger portion of revenue of the county diverts to less productive security and defense activities from the developmental activities. Further, terrorist actions increase the uncertainty in the market, restricts the business and trade activities leading to hold back the economic growth. The increase in the terrorist incidents may possibly reduce the inflows of foreign direct investment (FDI); decrease in exports; increase capital flight; rise in inflation; closure of industries in conflict zones; diminishing tourism; destruction of infrastructure and roads; and discontinued education of youth.

Terrorism is also the cause for the displacement of thousands of people. In short, terrorism has negatively affected growth & development and forced an intense economic burden on the economy of Pakistan. The general loss of self-assurance in economy resulting helplessness to catch the attention of foreign investors and high defense & security expenditure lead to economic distortions which further impact the economic growth and instability in the country. That is why it becomes important to know the impact of terrorism on different macro-economic variables, particularly on the economic growth of Pakistan.

Justification of the Study

Pakistan has been severely affected by terrorism. But still terrorism in Pakistan has attracted comparatively small academic attention. Therefore, there is a need to conduct a study based on empirical work with well-defined variables, recent new data, and fresh development in dynamic modelling to highlight the basic reasons of terrorism and factors which are responsible for destroying Pakistan economy. This study will help the policy-makers and investors to recognize the dynamics of terrorism and will also provide a support to related authorities and government to make better and suitable policies and strategies to eliminate terrorism from Pakistan.

Literature Review

The relationship between economic growth and terrorism has got multifold attention in the last two decades due to the increase in the terrorist activities after the 9/11 incident. Many countries have been under the curse of terrorism and have lost hundreds of people, their capital, and faced severe losses in their economic growth due to the distruction of infrastructure and disruption in the process of econmic growth. Terrerosim is considerd one of the main hurdle in the economic growth of an economy as terrorism destroys the infrasturcture, confidence of the investros, capital, thus, put a halt to the economic growth of the country.

According to the previous literature, terrosim has a negative impact on the economic growth of a country. A strand of literature including Nasir et al. (2008); Hyder et al. (2015); Levine et al. (1992); Benmelech et al. (2010); Blomberg (2010); Freytag et al. (2011); Araz-Takay et al. (2009); Zeb et al. (2014); Ozsoy et al. (2010); Blomberg et al. (2002); and Tavares (2004) have highlighted that terrorism has a long term negative impact on economic growth of a country. Bilgel et al. (2015) found that the per capita real GDP of Turkey declined by about 6.6% due to terrorism. Similarly, Yang et al. (2011) and Shahbaz et al. (2011) also found a long-run negative relationship between terrorism and economic growth. The results of their studies revealed that terrorism is one of the main hurdles in the way of economic growth of an economy.

Another strand of literature argued that increase in the terrorist activities and terrorism incidents have led to decrease in the annual GDP growth in the affected countries. Gaibulloev et al. (2009) in his paper, 'The impact of Terrorism and Conflicts on the Growth in Asia' concluded that terrorist activities reduce GDP per capita growth by about 1.5%. Moreover, according to Roberts (2009), the terrorist attacks negatively affect the exchange rate, unemployment levels, inflation rate, GDP, interest rates, consumption, trade and investment. Similarly, Abadie et al. (2008), Piazza (2006), Nitsch et al. (2004), Abadie et al. (2003) and Blomberg et al. (2004) found a reduction of 1% to 10% in the economic growth of different countries facing the evil of terrorism. Similarly, Shahbaz (2013) also found that when there is an increase in terrorist attacks, the inflation increases and economic growth decreases. The impact of the 9/11 attacks on the GDP growth are around a 0.50 % or $60 billion decrease in GDP growth (Blomberg et al. 2009). Furthermore, Gaibulloev et al. (2008) found that a terrorist event per million persons reduces the economic growth by 0.4%. The international terrorism has big impact on income per capita growth than domestic terrorism. Knight et al. (1996) found the same results that an additional 2.2 % of GDP spent on the securities that will result in loss of approximately 2% to GDP. While Abadie et al. (2003) claimed that the occurrence of terrorism in the late 1960's declined the per capita GDP by 10%. In Sri Lanka, as Samaranayake (1999) shows, terrorism slows down the economic growth and increases unemployment and inflation.

RESEARCH METHODOLOGY
Data sources
To find out the impact of terrorism along with other macroeconomic variables on economic growth of Pakistan, the secondary data has been collected from Global Terrorism Data Base and World Bank Reports.

Estimation Technique:
The study applied the unit root test of Augmented Dickey Fuller (ADF) to check the stationary of data. The Autoregressive Distributed Lagged (ARDL) bound test of co-integration was used to detect the existence of long run relationship among the variables. The study employed ARDL model to find out the long and short-run estimates of the model simultaneously. The ARDL model estimated the long-run

results based on the ordinary least squares (OLS) approach. To measure the short-run coefficients the study applied the Error Correction Mechanism (ECM) under the ARDL approach. The dependent variable of the model is economic growth. The independent variables are terrorist attacks, human capital, trade openness, inflation rate and population growth rate. The study utilized the annual time series data of Pakistan over a period 1980-2016.

Functional Form of the Model

To derive the hypothetical model for this present study, the Solow classical model for economic growth provides the necessary fundamentals. However, this model doesn't take into consideration the role of human capital for the determination of economic growth. In 1992, Mankiw, Romer, and Wei have incorporated the role of human capital in the growth models. The desired model can be specified as: Economic growth (GDP) is assumed to be the function of the Labor force (POP), stocks of physical capital (K), Human capital (HC) and a vector of other variables (Z) including terrorism and technology.

$$GDP = f(K, POP, HC; Z) \tag{1}$$

On the basis of economic growth theories and available different empirical studies on the economic growth and terrorism, transforming the values into natural logarithm form avoid the sharpness in time series data. The relationships between the different macroeconomic variables are not linear and various macroeconomic variables are measured by different units so, to avoid this problem, log linear specification is used for analysis. Another benefit and advantage of this natural-log transformation is that it directly provides elasticities of the coefficients. The subsequent reduced form of equation can be derived as follows:

$$\ln GDP_t = \beta_0 + \beta_1 \ln PGR_t + \beta_2 \ln HC_t + \beta_3 \ln TOP_t + \beta_4 \ln TER_t + \beta_5 \ln INF_t + \varepsilon_t \tag{2}$$

Where GDP is the real GDP growth rate (%); PGR is the population growth rate (measured by the increase of number of inhabitants within a country in a given period of time); HC represent the human capital (secondary enrollment ratio); TOP represent trade openness (export plus import to GDP ratio) in billions of US dollars, number of terrorist incidents in a year are represented by TER; INF represent Inflation rate in terms of percent change in the Consumer Price Index. The expected sign of β_1 is negative as an increase in the population growth of the country is fast the per capita GDP of the country will be lower. The expected sign of β_2 is positive as hman capital i.e. an increase in the skills and education of the labour force and workers can lead to an increase in the economic growth of the country. Similarly, the expected sign of β_3 can be both positive and negative as it is argued that international trade can be helpful as well as harmful for an economy depending on the phase of economic development. The expected sign of β_4 is negative as terrorist activities can destroy the infrastructure, economic activities, and can be a hurdle in the way of investments, thus leading to a

decrease in the economic growth. Similarly, the expected sign of β_5 is negative as inflation in any economy can be a hurdle in the way of economic growth.

The ARDL model can be written as follows:

$$\Delta \ln GDP_t = \beta o + \sum_{i=1}^{p} \beta_1 \Delta lnGDP_{t-i} + \sum_{i=1}^{p} \beta_2 \Delta lnPGR_{t-i} + \sum_{i=1}^{p} \beta_3 \Delta lnHC_{t-i}$$
$$+ \sum_{i=1}^{p} \beta_4 \Delta \ln TOP_{t-i} + \sum_{i=1}^{p} \beta_5 \Delta lnTER_{t-i} + \sum_{i=1}^{p} \beta_6 \Delta lnINF_{t-i}$$
$$+ \lambda_1 \ln GDP_{t-i} + \lambda_2 lnPGR_{t-i} + \lambda_3 lnHC_{t-i} + \lambda_4 \ln TOP_{t-i}$$
$$+ \lambda_5 lnTER_{t-i} + \lambda_6 lnINF_{t-i} + \varepsilon_t \qquad (3)$$

Where the drift component is represented by β_0 and ε_t is the white noise term. The error correction dynamics for short run are represented by the terms with summation signs while the long-run relation is shown in the second part of the equation represented by λ. The existence of the long-run relationship is checked via the joint F-statistic or Wald statistic by considering the null hypothesis of no co-integration, $H_0 = \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0$, while the alternative hypothesis is $H_1: \lambda_1 \neq 0, \lambda_2 \neq 0, \lambda_3 \neq 0, \lambda_4 \neq 0, \lambda_5 \neq 0, \lambda_6 \neq 0$. To compare the calculated F-statistic, Pesaran et al; (2001) suggested two sets of critical values assuming that either all the variables are I (0) and in other set all the variables are I (1). The null hypothesis will be rejected regardless of the whether the variables are I (0) or I (1), if the calculated F-statistic is more than the upper bounds critical value. The null hypothesis cannot be rejected if the calculated F-statistic is below the lower critical value and there will be no long-run relationship between the variables. Similarly, the test will be inconclusive if it falls in between the band of critical values (Pesaran et al; 1997).The short-run estimates of the model can be estimated using error correction mechanism (ECM) under ARDL. The ECM model can be represented as:

$$\Delta \ln GDP_t = \beta o + \sum_{i=1}^{p} \beta_1 \Delta lnGDP_{t-i} + \sum_{i=1}^{p} \beta_2 \Delta lnPGR_{t-i} + \sum_{i=1}^{p} \beta_3 \Delta lnHC_{t-i} +$$
$$+ \sum_{i=1}^{p} \beta_4 \Delta \ln TOP_{t-i} + \sum_{i=1}^{p} \beta_5 \Delta lnTER_{t-i} + \sum_{i=1}^{p} \beta_6 \Delta lnINF_{t-i}$$
$$+ \varepsilon_t \qquad (4)$$

Results and Discussions
The first step in estimating the time series that is to check for the stationarity of the data. For this reason, Augmented Dickey Fuller (ADF) tests are carried out. The Results reveal that all the variables except terrorism and economic growth are non-

stationary at level but at first differences they became stationary. Thus, the study reveal that the order of integration of the variables is a mixture of order I (0) and I(1) as shown in Table 1. The appropriate optimal lag length for the models is determined based on Akaike information criterion (AIC). After the results of the unit root tests we cannot apply the familiar Johansen Co-integration technique as the variables are a mixture of I (0) and I (1), thus, the appropriate co-integration test in this case is the ARDL bounds test of co-integration. The bounds test decides if there is a long-run co-integration between the variables of the model. Since the value of the bounds test is greater than the upper bound critical value at 5%, thus, the ARDL bounds test for co-integration approach reveals the presence of a long-term relationship amongst the economic growth and independent variables over a period of 1980 -2016 as shown in Table 2.

ARDL Long-Run Results
After knowing that there exists long run co-integration between the variables, the next step is to estimate the long and short run relationship between the study variables. The current study applied the ARDL approach to simultaneously estimate the long and short-run coefficients of the model. The study applied the OLS technique under ARDL approach to find out the long-run results of the model. The long-run results of the study state that an increase in the population growth lead to a decrease in the economic growth, as more and more population mean that the per capita income will decrease if there is no such proportion between the rise in the population growth and GDP growth rate. This outcome of the study is in line with the previous work of (Klasen et al., 2007 & Peterson, 2017). The long-run estimates of the study further reveal that there is a negative relationship between terrorists attacks and the growth of the economy i.e. an increase in the terrorists attacks will reduce the GDP of the country due to destruction of the infrastructure, roads, building, loss in the confidence of investors which in turn will reduce the domestic and foreign investments in the industrial sector of the economy. The terrorist activities in a country make that country less attractive for investments and governments tend to transfer a huge part of the budget towards the construction of the destroyed infrastructure which results in a cut of budget from some other development sectors of the economy resulting in a decrease in the growth rate of the economy. This outcome of the study is in line with the work of (Cinar, 2017 & Khan et al., 2016). Due to an increase in the terrorist activities in an economy the government must spend more on the security of the people and public places, thus, wasting a part of budget on these non-productive activities, which result in the slowness of the economic growth of the country. Similarly, an increase in the terrorist attacks can also result in an increase in the capital flight outward, thus, resulting in an under production and reducing production. The long-run results of the study are presented in Table 3.

Moreover, the long-run results of the study insert that an increase in the skills of worker, an improvement in the level of education in the working class and an improvement in the technological know-how of the workforce in a country, i.e. an increase in the human capital of the country can lead to an increase in the economic

activities, and thus an improvement in the economic growth of the country. This outcome of the study in similar to the outcome of the previous researchers including (Ali, H. et al., 2016; Ali, S. et al., 2012; Whalley et al., 2013). The study further posits that in the long-run inflation can be deleterious to the economic prosperity of the country, i.e. an increase in the inflation rate in the country can lead to a decrease in the economic growth. Last but not the least, the impact of inflation on the economic growth of the country is according to the priori expectations as inflation can be a hurdle in the progress of any economy. The outcome of the current study posits that inflation in the country is negatively related to the economic growth and an increase in the inflation rate can put a halt to the economic growth of the country. This outcome of the study is in line with the previous work of (Ayyoub et al., 2011 & Kasidi et al., 2013); and in accordance with the previous work of (Attari et al., 2013; Ayyoub et al., 2011 & Kasidi et al.,2013). Furthermore, the long-run results of the study reveal that openness to international trade can improve the economic condition of an economy. It is argued that trade openness can increase the economic growth of a country via the increased demand in the international market based on the scale effect if the country is having the comparative advantage in producing a product. This outcome of the study is in line with the work of (Keho et al., 2017 & Klasra, 2011) among others. International trade can improve the production capacity of a country if the country imports the modern technology and implement that technology in the industrial sector of the economy.

The lower part of Table 3 represents the diagnostic results of the tests to investigate the overall properties of the model. The study employed the serial correlation test on the data to find out if there is any problem of serial correlation in model. The outcome of the test indicates that there is no problem of serial correlation in the data. The study also employed the tests of normality and heteroscedasticity on the model and concluded that the data is normally distributed and there is no problem of heteroscedasticity in model. The stability of the model in the long-run is evaluated under the Ramsey's RESET test and the results indicate the model is stable as there are no omitted variables from model and the functional form the model is also correct.

ARDL Short-Run Results
The short-run results of the study are estimated by applying the error correction mechanism (ECM) under the ARDL approach. The ECM show the effect of independent variables on the dependent variable in short run and the speed of adjustment towards the long-run equilibrium if there is any short-run disequilibrium in the model. The ARDL short-run results reveal the short-run estimates of the coefficients in order to know the short-run relationship between the variables. The results of ECM under ARDL approach indicate that population growth in the short-run can be helpful in increasing the economic growth of the country as more labor input can produce huge amount of output. The short-run results of the study further reveal that human capital can be productive in the short-run in Pakistan as more skillful workers can contribute more towards the output in the country. Human capital is

considered as one of the main input factors in determining the economic growth of the country, thus, an increase in the human capital of the workers will lead to an increase in the economic growth of Pakistan.

Furthermore, the short-run results of the study indicate that increase in the terrorist attacks in Pakistan even in the short-run are harmful towards the economic prosperity of the country. The terrorist attacks even in the short-run can be a threat to the economy as there will be unrest and chaos in the country and the businesses will not grow that much due to the uncertain position of the market. Moreover, the impact of inflation in the short-run is like that of the long-run i.e. an increase in the rate of inflation in the country in short-run will lead to a decrease in the economic growth of the country. This outcome is very much general as inflation in one of the key hurdles in the way of economic growth in the country. Last but not the least, the short-run impact of trade openness on the economic growth of Pakistan is negative. Since, in the case of Pakistan, there is a huge trade deficit as imports are far larger than exports of the country, thus, trade can be harmful to economic growth.

The lower part of Table 4 shows that diagnostic tests results of the study. The results of diagnostic tests indicate that there is 65% variation in the dependent variable due to changes in the independent variables as shown by the value of R^2. The results further indicate that the value of Durbin Watson is greater than the R^2 value indicating that the model estimates are not spurious. The F-statistics and probability value of F-statistics shows that the model is stable. The current study further emphasized on the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) tests of stability to investigate the overall stability of the model under 5% critical values. The results of both the CUSUM and CUSUMSQ tests indicate that the model is good fit as the graphs of both the test lie inside the critical lines at 5%.

Conclusions and Recommendations
The results of the study clearly indicate that Pakistan has incredible/remarkable potential in provisions of human and social assets. But the circumstances in Pakistan are not conducive, as the state is suffering from countless issues that are slowing down the development of the area. Lack of education, economic opportunities, proper health facilities, investment, poverty and low standard of living keep the inhabitants of affected areas at an inconvenience. The negative impact of terrorism on economic growth is proved beyond doubt from the findings of the present study and countless other studies, thus it is suggested that strong action should be taken to eradicate this evil of terrorism from the country. Political instability is also a key player in promotion of terrorism. Political stability is must for a prosperous Pakistan and thus will promote economic stability and help in reducing terrorism. Attempt should be made for the rehabilitation of health, agriculture and manufacturing sectors. Emphasis should be given to educate the youth and children especially in these terrorisms affected areas. Various kinds of creative, technical and skill trainings should be given, and awareness

programs should be arranged for the youth so that they can't be easily hired by these terrorist groups. Attempts are required to establish various departments or organizations in the terrorism affected areas to provide the local population with different job opportunities, quick deliverance of aid, standard school meetings, hospitals with all facilities and the social associations should be developed, in order to build friendliness and trust linkage between the population and government. Many affected areas, predominantly Malakand Division of Khyber Pakhtunkhwa has a geo-strategic importance and these areas can be used as trade route for Central Asia and China. By developing these areas, it will provide the ideal employment opportunities to the citizens of Pakistan.

The government should emphasize on the improvement of law and order in the areas affected by terrorism which in turn would lead to increase in investor confidence, generate economic activities creating job opportunities and improved infrastructure. The efforts are required for the improvement and development of roads, infrastructure and industrialization in the distressed areas by utilizing the local natural resources and assets. As a result, inhabitants would not merely get employments but will also directly participate in the development of the nation and in this way the economic depravity might be removed from the country. The pleasing security circumstances therefore will catch the attention of foreign investors in the country, improving economic growth. The efforts are required to develop the terrorism affected areas by establishing some useful incentive systems, for-instance, tax free zones to encourage the businessmen and investors to set up their businesses in the terrorism affected regions. New businesses could help in overcoming the issues of poverty and unemployment in these regions. Terrorism and sectarianism go hand in hand, thus, the scourge of sectarianism needs to be eradicated for terrorism to be fully controlled.

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ANNEXURE
Table 1: ADF Unit Root Test Results (Intercept and a Trend)

Variables	t-statistics	Probability	t-statistics	Probability	Conclusion
Level I(0)			First Difference I(1)		
lnGDP	-4.0887	0.0148	-	-	I(0)
lnPGR	-2.0888	0.2502	-4.5289	0.0010	I(1)
lnTER	-3.8696	0.0247	-	-	I(0)
lnHC	-2.9990	0.1485	-5.8056	0.0002	I(1)
lnTOP	-3.1332	0.1151	-7.9980	0.0000	I(1)
lnINF	-2.4522	0.3481	-5.8796	0.0002	I(1)

Source: Results obtained by analyzing data through Eviews 9

Table 2: ARDL Bounds Test Results

Model	ARDL	F-Statistics	ECT$_{t-1}$ (t-statistics)	Conclusion
flnGDP(flngdp/ lnPGRlnTerlnHClnTOPlnINF	(4 2 3 2 4 4)	4.531538**	-0.925582 (-6.821546)***	Cointegration

Critical Values	Lower Bound I0	Upper Bound I1
10% significance level	2.26	3.35
5% significance level	2.62	3.79
1% significance level	3.41	4.68

Source: Results obtained by analyzing data through Eviews 9

Table 3: Long run coefficients of ARDL (4,2,3,2,4,4): Dependent variable: lnGDP

| Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPGR	-4.416662	5.262382	-0.839290	0.4257
LNHC	-12.232549	9.808628	-1.247121	0.0026
LNTER	0.879705	0.769478	1.143248	0.2860
LNINF	-1.049419	1.303013	-0.805378	0.4439
LNTOP	-9.674115	7.662746	-1.262487	0.2423
C	90.589508	65.473852	1.383598	0.0013
Diagnostic Tests				
Serial Correlation	3.4721 (0.176)	Normality (JB test)	4.1620 (0.124)	
Heteroscedasticity	10.1166 (0.519)	Ramsey's RESET	0.0736 (0.788)	

Source: Results obtained by analyzing data through Eviews 9

Table 4: Error Correction Representation of the ARDL (4,2,3,2,4,4)
Dependent Variable: LNGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP(-1))	-0.170962	0.282542	-0.605087	0.5619
D(LNGDP(-2))	-0.162415	0.233922	-0.694312	0.5071
D(LNGDP(-3))	-0.363254	0.190422	-1.907630	0.0929
D(LNPGR)	9.582604	10.025600	0.955814	0.3672
D(LNPGR(-1))	16.669491	11.716361	1.422753	0.1926
D(LNHC)	-9.473939	5.671097	-1.670566	0.1334
D(LNHC(-1))	-9.261651	7.091996	-1.305930	0.2279
D(LNHC(-2))	5.592444	4.740544	1.179705	0.2720
D(LNINF)	-0.080166	0.312771	0.256309	0.8042
D(LNINF(-1))	0.668785	0.338408	1.976271	0.0835
D(LNTOP)	-0.851878	1.855768	-0.459043	0.6584
D(LNTOP(-1))	-0.390726	1.679177	-0.232689	0.8218
D(LNTOP(-2))	3.703042	1.784320	2.075324	0.0716
D(LNTOP(-3))	1.262542	1.735305	0.727562	0.4876
D(LNTER)	0.122514	0.063939	1.916112	0.0917
D(LNTER(-1))	-0.056668	0.080530	-0.703684	0.5016
D(LNTER(-2))	-0.039561	0.099697	-0.396811	0.7019
D(LNTER(-3))	-0.263230	0.074182	-3.548429	0.0075
CointEq(-1)	-0.580819	0.343074	-1.692986	0.0289
Diagnostic Tests				
R^2	0.650732	**Sum of square Residuals**		3.657818
Adjusted R^2	0.549080	**F statistics (Prob)**		2.3954 (0.0416)
S.E Regression	0.450791	**Durbin Watson Statsitics**		2.091956

Source: Results obtained by analyzing data through Eviews 9

Figure 1: CUSUM and CUSUMSQ Test Results

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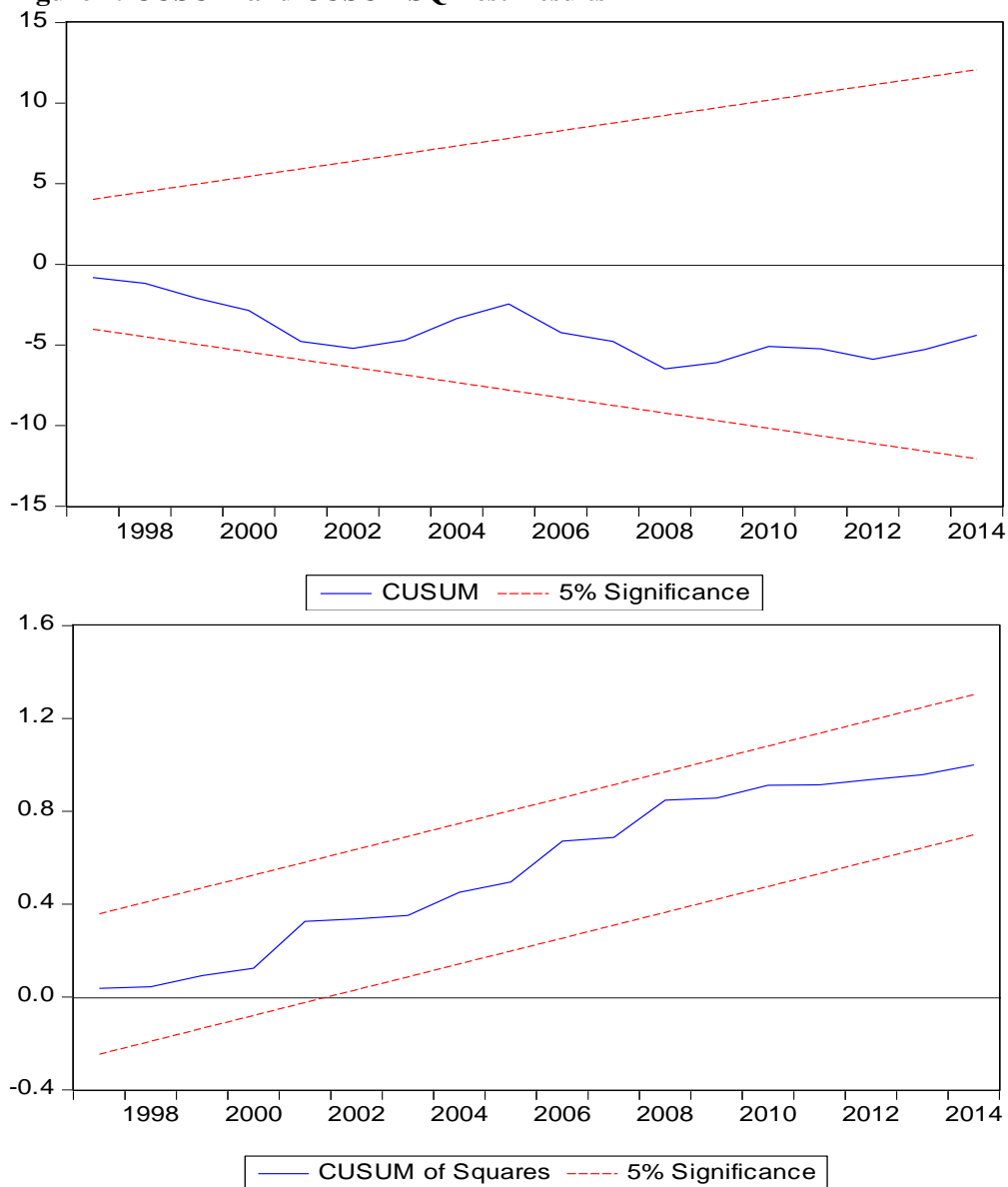
[1]This is a revised and altered version of my unpublished PhD work I submitted to the University of Peshawar. I completed my work under the supervision of Professor Munir Khan Khattak.