

# **DETERMINANTS OF TERRORISM: PANEL DATA ANALYSIS**

*By*

**Muhammad Azhar**

*Supervisor:*

**Dr. Hasan M. Mohsin**

Senior Research Economist

Pakistan Institute of Development Economics (PIDE),

Islamabad, Pakistan



A Research Dissertation submitted to the Pakistan Institute of Development Economics (PIDE), Islamabad, in partial fulfillment of the requirements for the award of the degree of Master of Philosophy in Economics.

April, 2013

**Dedication:**

*This thesis is dedicated to my parents, my wife and children who have always stood by me and dealt with all of my absence from many family occasions with a smile.*



## **ACKNOWLEDGEMENT**

It is with great pleasure that I thank my supervisor Dr. Hasan M. Mohsin for guiding me in my research dissertation. I am deeply indebted for his enthusiastic supervision, able guidance and consistent encouragement through out the preparation and writing of this thesis. His guidance, encouragement and belief in me made my success possible, particularly his expert opinions that really helped me in conducting this research dissertation. However, I alone hold the responsibility for any error and omission, which are not of course deliberate.

I am also grateful to my honorable teachers, Dr. Musleh-ud-Din, Dr. Rehana Siddiqui, Dr. Ejaz Ghani, Dr. Muhammad Iqbal, Dr. Zafar Moin Nasir and Dr. Attiya Yasmin for their consistent help, encouragement and guidance extended to me during my course of studies.

I especially want to express my sincere appreciation to Mr. Akbarullah for his support during estimation and analysis. I also acknowledge the help and moral support by my all student fellows and colleagues.

I am also grateful to Dr. Sajid Amin, Mr. Adnan Hyder and Mr. Muhammad Nawaz for their useful comments and support during estimation and analysis.

I also acknowledge my family members for the love and comforts they provided me during my study. Extraordinary and inspiring encouragement and support of my parents and other members

of my family always provide me peaceful environment for my study as well as my best career and life, their prayers are not worth mentioning.

Finally, I wish to acknowledge the consistent support and encouragement of my wife and children, without their help this end product would not have been possible.

Muhammad Azhar

April, 2013.

## Table of contents

<u>S.No.</u>	<u>Contents</u>	<u>Page No.</u>
1.	Introduction	1
1.2	Objectives of the study	3
1.3	Significance of the study	3
1.4	Testable Hypothesis	4
1.5	Transmission Mechanism of terrorism	4
1.6	Organization of the study	6
2.	Review of Relevant Literature	7
3.	Theoretical Framework	14
4.	Data and Econometric Model Specification	20
4.1	Data and Variables	20
4.2	Econometric Specification	23
5.	Model Tests, Results and Discussion	27
5.1	Tests of the data and model	27
5.1.1	Panel Unit Root Tests	27
5.1.2	Tests for Individual Effects	29
5.1.3	Hausman Test- Fixed Effects versus Random Effects	32
5.2	Empirical Results and Discussion	34
5.2.1	Dummy Variables analysis for different regions	39
5.2.2	Dummy variables analysis- Slope	42

## Table of contents

<u>S.No.</u>	<u>Contents</u>	<u>Page No.</u>
6.	Conclusion and policy suggestions	45
7.	References	48
8.	Appendices	53

## **Abstract**

This study attempts to quantify empirically the factors behind terrorism in a sample of 36 countries. Panel data covering the period from 1984 to 2008 is used. The sample includes United States, Mexico, Colombia, Brazil, Chile, Argentina, United Kingdom, Bulgaria, Romania, Cameroon, Nigeria, Kenya, South Africa, Morocco, Tunisia, Libya, Sudan, Iran, Turkey, Iraq, Egypt, Syria, Israel, Saudi Arabia, Bahrain, China, India, Pakistan, Bangladesh, Myanmar, Sri Lanka, Thailand, Malaysia, Singapore, Philippines and Indonesia. In this study's most complete model, regressors include corruption, consumer price index, openness, education, per capita growth and political instability. Fix effect model has been used to estimate the model. We find education to be a negative determinant of terrorism—i.e., lower education levels give rise to more transnational terrorism in sample countries. Where as corruption and consumer price index are positive determinants of terrorism. Growth rate of per capita and political instability are also having negative influence on terrorism.



# Chapter 1

## Introduction

Terrorism is a form of violence that affects human lives on many levels. It may force individuals to change their behavior in search of peace and safety. It may energize, unite in struggle or divide whole societies. It may move groups of people or nations that are not directly affected by the violence but nevertheless wishing to help, either by pressurizing their governments to react, or by contributing to Humanitarian projects. Businesses are likely to be forced to change their ways of conduct when their insurance premiums increase. Governments, or multilateral organizations, may also be attacked by terrorists. So, they may have to adjust their policies and move resources to an appropriate place. Even those authorities that have not been directly affected may be expected to take some steps. Apparently, such a wide range of potential effects could not have skipped the attention of researchers in various disciplines, including economics.

According to Enders and Sandler (2006), the definition of terrorism used in this thesis is: *“the premeditated use or threat of use of violence by individuals or sub national groups to obtain a political or social objective through intimidation of a large audience beyond that of the immediate victims”*.

As per national identity of the involved elements, terrorism is divided into two types: domestic and international. If the repercussion of the attack remains within the borders of the country, then it is called domestic terrorism. If the repercussion goes beyond the borders, then an attack is considered to be international (Sandler, Arce et al. 2008). The example of domestic terrorism is the bombing in Oklahoma City in 1995, because the perpetrator, victims and

audience were all US citizens. (La Free and Dugan, 2008). In contrast, the bombing of the Islamabad Marriott Hotel on 20<sup>th</sup> of September 2008 is an example of international terrorism, because the blast killed foreigners, including a Czech ambassador (Hussain, 2008).

Terrorism, which is a less intensive form of violence, has been around for centuries (Sandler, Arce *et al.* 2008), but it was the September 11 attacks, henceforth 9/11, and the ensuing War on Terror that boosted public and researchers' interest in this form of violence. The attacks demonstrated how a complicated, unpredictable and dangerous problem the world is facing. That people realized it a large scale damage to both human and physical capital (Becker and Murphy 2001). By exposing the vulnerability to terrorism of the most advanced global power, 9/11 seemed to have made the need to understand patterns governing wars and terrorism more pressing in the eyes of the Western world. This has resulted in an increased research.

Apart from this conventional wisdom about dynamics of terrorism in the world many observers and political economists associate it with socio-economic variables, like high level of poverty, low level of literacy rate, high density of population (Testas, 2004) and other class of thinkers associate it with political-economy variables, like lack of governance, weak institutions, political instability, low level of economic freedom (Abadie, 2004, 2006). They have argued that weak institutions as well as lack of good governance make governments unable to enforce the law and control illegal activities that create terrorist activities. In a similar way low level of economic of freedom hinders the people to put their capital according to their own set of choices.

In many countries, over the period of time, the level of corruption and economic informal activities increased rapidly. Informal economy, which is measured as a percent of gross domestic product, is estimated from 30% to 40% on average for some developing countries. This is high as compared with developed economies (Gulzar, *et al.* 2011). Poverty level is also very high

combined with low level of literacy rate that worsens the situation of terrorism over the period of time (Nasir, *et al.* 2011 and (Bravo and Dias, 2006).

On the basis of above arguments it is thorny to evaluate the consequences of corruption, literacy rate, openness and political instability on terrorism activities in the world especially in developing countries. The study puts an effort to make significant association among all the variables and to find their empirical conclusions on the basis of data and use these results for policy control which offers enormous contribution for political economy literature of terrorism in the world.

## **1.2 Objectives of the Study:**

1. To check empirically the effects (if any) of different economic variables, GDP per capita, Inflation, Openness and social variables corruption, Education and Political Instability on terrorism.
2. To explore that whether these factors affect the different regions of the world using different dummies.
3. To explore whether these factors affect over time i.e. before 9/11 and after 9/11.

## **1.3 Significance of the Study:**

The debate on terrorism became more critical issue after the event of 9/11, and as we know that world became severe victim of terrorist activities, especially south Asia (Nasir, *et al.*, 2011). Similarly corruption, economic of freedom, Political instability and weak institutions also became leading features of underdeveloped countries like Pakistan. A number of studies have done to see the effects of Political instability, economic of freedom etc separately on economic growth and terrorism but no one have taken an in-depth study to explore their combined impact

on terrorism. We have hardly seen any study that have tested the impact of corruption on terrorism. We fill this gap by incorporating corruption and all other variables for a sample of 36 developing and developed countries. So this is our additional contribution toward political economy literature.

#### **1.4 Testable Hypothesis:**

Our study hypothesis with full policy relevance is quite straightforward. The null hypothesis are given as:

**H<sub>01</sub>:** Corruption, Political Instability and CPI has a positive and significant impact on Terrorism

**H<sub>02</sub>:** High per capita income, education and openness negatively affect terrorism

#### **1.5. Transmission Mechanism of Terrorism:**

The major issue as economists is to define transmission channel of socio economic variables with terrorism. The literature has defined the following channels through which Corruption, CPI, GDP per capita and Openness tend to affect terrorism.

Corruption can lead to terror activities. More corruption in any society means that the rich class of the society in question may be able to meet their illegal demands by lobbying and bribing the authorities, while the poor may not be able to get their legal and ethical rights due to their backward financial background. If such a phenomenon tends to exist in any society over a period of time, it will create a sense of deprivation and frustration among the poor. And this sense of deprivation and exploitation among the poor may lead them to get their right by use of any force that they can afford threatening the status quo.

CPI growth indicates that higher inflation in the sample countries may lead to more terror activities. Inflation may reduce the real purchasing power of the people. The poor segment of the society is more vulnerable to rising inflation compared to elite class and they are forced down to the poverty trap. Under such circumstances the opportunity cost of life reduces making terrorism a plausible course of action for the poor to achieve necessary resources. In fact many will tradeoff their lives to generate financial resources for their families which pursue them for terrorist acts.

Trade openness is the measure of the ratio of export plus import to GDP. In the case of developed countries, they have more resources. There is hardly any issue with provision of energy and governance. Their trade policy i.e. tariff structure is well defined. They can increase more employment through openness due to output increase that can lead to high per capita income as well as increase the opportunity cost of involving in terrorism. For the developing countries, if economic integration benefits the poor through gain from trade, it may reduce the terror activities. On the other hand, transportation cost across borders is lowered because of trade openness, thus increasing terrorist activities (Mirza and Verdier 2008).

Developing countries try to educate their residents. Through education they are well aware of their rights. They can perform and compete well in the society. In developed countries, people are provided opportunities to increase their education level. They feel better in their social and economic decisions. Education may lead to improvement in human resource development that can enhance the living standard by increasing the per capita income. The opportunity cost of committing terror is considerably high that forces them to restrain from these activities (Azam and Thelen, 2008).

Growth Rate Per Capita is the income position of the individuals living in the society. Income and sources of income of individuals play very important role in influencing the way of living and attitude of people toward society. If one enjoys good income status in the society then it is very hard for him to engage himself in activities that are considered unethical and unfair in the society because the opportunity cost for such individuals to indulge in such activities will be very high (Gurr, 1970).

Political factors are promoted by media and telecommunication. Politicians are the part of political system. The parliamentarians are responsible for formulation of laws and constitution. If the parliamentarians are well educated they provide good, educated political environment. If the political environment of a country is stable it may lead to peace and harmony through different channels. It may create stable economic environment in the country, leading to better financial and economic activities in the country. Such activities may lead to increase domestic and foreign investment and hence production. Due to increase in production more employment and income can be generated. The increase in income may lead to high living standard making high opportunity cost in involving terror activities (Li 2005: Campos and Gassebner 2009: Weinberg and Eubank 1998).

## **1.6 Organization of the study:**

The study proceeds as follows. After the introduction in chapter-1, chapter-2 reviews the findings from previous studies in the area. Chapter-3 gives the theoretical framework. Chapter-4 consists of data and econometric specification. Chapter-5 gives model test results and discussion. Chapter-6 gives conclusions and some policy recommendations. After that References and Appendices have been provided.

## Chapter 2

### Review of Relevant Literature

This chapter provides the comparison of previous literature on terrorism and its determinants.

Gurr, T. R., (1968) provided the theory of economic deprivation which was based on the argument of economic discontent. The economic discontent appeared due to the difference between actual payoffs and expected payoffs of the individuals. They concluded that this discrepancy lead to anger and frustration among individuals and then lead to violence.

Olson (1963) discussed that when there is a rapid economic growth due to methods of production or technological improvements, the important industries change their types of their labor demanded. In these circumstances the demand for skilled labor increases. They get more wages creating imbalances due to increase in demand and sticky wages. The unemployed segment of the society, due the technological improvement, is frustrated. So, these frustrated unskilled laborers become destabilizing force and cause violence.

Hussain (2003) presented the theoretical evidence to analyse the relationship among the Terrorism, Economic development and Democracy in Pakistan. The key endeavor of this paper is to find out the root cause of terrorism, political instability and their significant impact on economic development. In this study they analyzed the interplay between the rise of religious militancy, the Pakistan government policies and high increase in poverty during period of 1980 to 2002. And they came up with the conclusion that during the years 1988 to 2000 the poverty line increased from 17% to 32% mainly due to low productivity growth. They suggested that the future of

Pakistan is associated with strengthening the institution of democracy and government must formulate the effective policies to alleviate poverty, illiteracy and avoid, in future, to become the breeding land of terrorism in Pakistan.

Blomberg,*et al.* (2004) attempted to find link between the state of economic condition and terrorism. They used a data set of 127 countries from 1968 to 1991. The main purpose of this study was to investigate the relationship among the economic standard of a country such as GDP, Investment and per capita income in order to counter the terrorism. They concluded that the economic actions and terrorism both are not independent of each other. They have strong influence or relationship with the economic condition of a country. They found that the countries which have high level of income and rich with democratic norms appeared to have a higher frequency of terrorism when there is a lower frequency of monetary contractions (recession).

Abadie, (2004) provided an empirical research on the determinants of the roots of terrorism at the country level. In this article they showed that terrorism is not only the subject of poverty and economic disparity but also have very significant linkage with the level of political freedom that explains terrorism. Results suggested that terrorism expanded when a country pass through the transition period i.e. from authoritarian to democratic period.

Teatas, (2004) tried to find the link between the state of economic condition and other variables like education, political repression, income and a dummy for civil war. They used the panel data set of 37 muslim countries covering the period from 1968 to 1991. They concluded that terrorism is positively affected by education it means that higher level of education give rise



to more transnational terrorism in the sample countries. Repression whether it is low or high and dummy for civil war are positive determinants of terrorism. The income variable is negatively related to terrorism.

Li, Q and Drew Schaub (2004) analyzed statistically the association between economic globalization and number of international terrorist attacks within countries. Economic globalization means that the growing integration of a country's economy into the world's goods, financial and capital markets. They used panel data of 112 countries covering the period from 1975 to 1997. The number of international terrorist incidents within a country in one year is taken as dependent variable. Openness, foreign direct investment, portfolio investment, economic development of country and the trading partner country are taken as independent variables. The control variables used are: Level of democracy, government capability, interstate conflict, temporal persistence, regional variations, and temporal unit effects. The results showed that there is no direct positive effect of FDI (foreign direct investment) and portfolio investment on international terrorist incidents within countries. If a country and its trading partner country are economically developing, then the terrorist incidents inside the country are reduced. As foreign direct investment and trade help to increase economic growth and development, economic globalization may have an indirect negative effect on international terrorist incidents.

Piazza (2006) tested the hypothesis of deprivation. They used variables like inflation, poverty, unemployment, malnutrition, poor economic condition and inequality. They found that there is no causal relation between economic growth and terrorism. The structure of party policies was found to be the significant predictor of terrorism. For this analysis they employed a

series of multiple regressions on terrorist incidents and casualties in 96 countries from 1986 to 2002.

Shabbier and Anwer (2007) investigated the major determinants of corruption in the case of developing countries. In this paper they divided the major determinants of corruption in two parts, economic and non economic determinants. They used cross sectional data set of 41 developing countries for comparative analysis. They concluded that the countries which have strong political norms are considered less corrupt as compare to others and coefficient of education has a positive and significant effect on corruption in the case of developing countries. Their findings also suggested that globalization, economic freedom, and economic development have played a significant role in reducing the level of corruption.

Freytag *et al.*(2008) estimated that per capita GDP and terrorism are positively related but European countries. The association changes into negative relation if per capita GDP is taken into quadratic form. The relationship between investment and terrorism is negative and significant. Human capital and terrorism are negatively related but positive in Islamic countries. The study covers the period 1971-2005.

Campos and Gassebner, (2009) pointed out the main causes of international terrorism. The major focus of this study was to estimate the link among the terrorism, the escalation effect and political instability of the countries. He assessed the impact of these variables on economic growth. The data covers a sample of 130 countries and time period from 1968 to 2004. They concluded that civil wars associated with the international terrorists activities and the advisory

power of escalation seems to rise over time. The low per capita income did not explaining the cause of international terrorism but the poverty became serious root cause of terrorism.

Saha, *et al.* (2009) investigated the impact of democracy and economic freedom on current level of corruption and their vigorous effect on 100 countries. In their study they used the cross-country panel data set of 100 nations for estimation purpose over the years 1995 to 2004. They utilized two methodologies these are panel least square (PLS) and fixed effects (FE) approach, to find out the empirical relationship of democracy, economic freedom and their interaction in term of scheming corruption. And they concluded that the interaction effect between democracy and economic freedom have significant impact to control the corruption. This empirical finding also supported the previous studies that if a country has low level of democracy and high degree of economic freedom that country has very low rate of corruption and vice versa. So they proposed that economic freedom and democracy both are essential to alleviate corruption.

Derin-Güre, (2009) investigated the main root causes of international and domestic terrorism by using a modern approach with fixed effect. In this research paper they used the panel data on cross country analysis over the period 1972 to 2006 from Memorial Institute of Prevention of Terrorism (MIPT) to estimate the impact of global, domestic and nationalist terrorism on economic growth. After employing the cross sectional techniques they came up with the conclusion that the domestic terrorism in poor countries did not extensively occurred but on the other hand they found that the richer country committed fewer terrorist attacks at home over the period of time. Their findings proved that better economic strategies can counter the

terrorism in a country that will provide greater help to reduce terrorist activities at international level.

Qureshi,*etal.* (2010) estimated the linkage between the political instability and its impact on economic volatility in the case of Pakistan. The basic objective of this paper was to empirically examine the relationship among the political variables and its impact on economic growth of Pakistan. They used the time series data over the period 1971 to 2008 and employed the OLS technique for estimation. In the end they concluded that there is a highly significant role of political variable on economic growth volatility and they also proved that during the years of political instability, there is high volatility in economic output in Pakistan.

Caruso, R., and Schneider, F., (2011) empirically investigated the socio-economic causes of terrorism in a sample of 12 Western European countries covering the period from 1994 to 2007. In their study the argument of opportunity cost was confirmed. For example if there is a large set of economic opportunities for individuals then there will be lower likelihood to be involved in terrorist activities. Terrorist brutality and expected future income are positively related to real GDP per capita. If GDP per capita increases by 1% then there will be decline in terrorist incidents by 3.5%. There is a negative relation between terrorism and long term interest rate. This relation is confirmed with the relation of investment and incidents. Findings also show that 1% increase in youth unemployment leads to 0.5% increase in terrorist activities.

Shahbaz and Shabbir (2011) investigated the static and dynamic effect of inflation and economic growth on terrorism using annual data from 1971 to 2010 in case of Pakistan. ARDL bounds testing and rolling window technique has been applied. Order of integration has been

checked by applying ADF unit root test. They concluded that there is co-integration between inflation, economic growth and terrorism in Pakistan. Inflation raises terrorism and economic growth is also a major contributor to terrorism. Bidirectional relationship has been found between inflation and terrorism while terrorism leads economic growth in the short run.

Nasir, M., *et al.* (2011) tried to estimate the determinants of terrorism in South Asian countries. They used negative binomial regression model on panel data for these countries from 1972 to 2004. The explanatory variables are income inequality, poverty, GDP per capita, inflation, literacy, repression and population density. They concluded that income inequality and terrorism have positive and significant relationship. But the relation with poverty is unexpected and insignificant. Inflation and literacy rate have positive relation and GDP per capita is negatively associated with terrorism. Other variables repression and repression square are positively and negatively related respectively. Lastly they concluded that the population is not the significant predictor of terrorism.

Shahbaz, M., *et al.* (2011), tried to analyze the relationship between terrorism and economic growth in Pakistan. They also used trade openness and capital. ARDL bound testing technique have been applied to see the long run relationship between these variables. Data from 1970 to 2010 is used for the analysis. Vector Error Correction Model (VECM) is used to see the causality between the economic growth and terrorism. They came up with the conclusion that there is a long run relationship between economic growth and terrorism. They also concluded that there is two way causality between terrorism and capital, trade openness and capital and terrorism and trade openness. They found that there is one way causality from economic growth to terrorism.

## Chapter 3

### Theoretical Framework

#### 3.1 Theoretical Framework

We are going to extend the neo-classical growth model of Solow Swan(1956) in order to model the determinants of terrorism. The production function of the economy is given as;

$$Y(t)= F(K(t), A(t)L(t) \quad (1)$$

Where K is capital and L is labor and A is technological parameter or total factor productivity parameter determines exogenously and t denotes the time (Barrow, Robert J., and Xavier Sala-i-Martin 2003).

It is noted that time enters the production function through K, L, and A but not directly. It means that over time output changes only with the change of input. With the given quantities of capital and labor, output increases over time because of technology.

It is also noted that A and L enter multiplicatively. AL is called to be an effective labor, and technological progress that comes in this fashion is known as labor-augmenting. The specification of A entering in this way with the other assumptions of the model means that  $\frac{K}{Y}$ , the ratio of capital to out put ultimately settles down.

Actually, when capital-output ratios do not demonstrate any clear upward or downward movement for the whole period, building the model so that the ratio is ultimately constant makes the analysis much simpler. We assume that A multiplies L is therefore very useful and well-suited.

Assumption:

Constant returns to scale:

It is assumed that the production function is homogeneous of degree one in capital and labor or has the constant return scale. It means that if we double the inputs (K and L), the output will be doubled. Mathematically, multiply both capital and labor by a constant b. the output will be increased by the same factor.

$$F(bK, bAL) = bF(K, AL) \text{ for all } b \geq 0$$

In the second assumption, it is said that inputs, capital and labor are important.

$$F(K, 0) = 0$$

$$F(L, 0) = 0$$

A strictly positive amount of inputs is needed to produce a positive amount of output.

This is also called an essentiality condition.

The third assumption is that the production function has positive and diminishing return to inputs. i.e.,

$$\frac{\partial F}{\partial L} > 0 \text{ and } \frac{\partial F}{\partial K} > 0$$

$$\frac{\partial^2 F}{\partial L^2} < 0 \text{ and } \frac{\partial^2 F}{\partial K^2} < 0$$

When technology is constant, each addition to capital yields positive output but this addition decreases as capital increases and each addition to labor yield positive output, but this addition decreases as labor units increases.

Fourth assumption is Inada condition.

$$\lim_{K \rightarrow 0} \frac{\partial F}{\partial K} = \infty \text{ and } \lim_{L \rightarrow 0} \frac{\partial F}{\partial L} = \infty$$

$$\lim_{K \rightarrow \infty} \frac{\partial F}{\partial K} = 0 \text{ and } \lim_{L \rightarrow \infty} \frac{\partial F}{\partial L} = 0$$

The above conditions state that the marginal product of capital is very large, when the capital stock is very small and marginal product of capital is very small when capital stock is large.

Using the assumption of constant returns to scale, we can transform the production function into intensive form. Putting  $b = \frac{1}{AL}$  in the above equation, we get

$$F\left(\frac{K}{AL}, 1\right) = \frac{1}{AL} F(K, AL) \text{ where,}$$

$\frac{K}{AL}$  is the amount of capital per unit of effective labor and  $\frac{1}{AL} F(K, AL)$  is output per unit of effective labor. If we take  $k = \frac{K}{AL}$  and  $y = \frac{Y}{AL}$  the above equation can be written in the intensive form as

$$y = f(k)$$

The intensive form function is assumed to satisfy the following conditions,

$$f(0) = 0$$

$$f'(k) > 0,$$

$$f''(k) < 0$$

$f'(k) > 0$  and  $f''(k) < 0$  implies that the marginal product of capital is positive and it declines as capital rises i.e., diminishing marginal product of capital. Next, it is assumed that the production function satisfy the standard Inada Conditions.

$$\lim_{k \rightarrow \infty} f'(k) = 0 \quad \text{and}$$

$$\lim_{k \rightarrow 0} f'(k) = \infty.$$

The above mentioned conditions imply that the marginal product of capital is very large, when the capital stock is very small and marginal product of capital is very small when the capital stock is very large.



Now we take Cob-Douglas production function.

$$Y = AK^\eta L^{1-\eta} \dots\dots\dots (2)$$

Value of  $\eta$  lies between zero and one and is called share of the capital and  $1-\eta$  is the labor share.

The Cob- Douglas production function satisfies the assumption of constant returns to scale.

If we divide the above function by L, We can write the intensive form of the above equation as:

$$y = Ak^\eta \tag{3}$$

Where  $y = \frac{Y}{L}$ , is the output per worker and

$k = \frac{K}{L}$  is the capital per worker.

The intensive-form production function is assumed to have the following properties:

Note that:

$$f(0)=0$$

$$f'(k) = A\eta k^{\eta-1} > 0,$$

$$f''(k) = -A\eta(1-\eta)k^{\eta-2} < 0,$$

$f'(k) > 0$  and  $f''(k) < 0$  imply that the marginal product of capital is greater than zero and it becomes negative as the capital rises. Next, it is assumed that the production function satisfy the standard Inada Conditions.

$$\lim_{k \rightarrow \infty} f'(k) = 0 \quad \text{and}$$

$$\lim_{k \rightarrow 0} f'(k) = \infty.$$

The above conditions imply that the marginal product of capital is very large, when the capital stock is very small and the marginal product of capital is very small when the capital stock is

very large. This ensures the convergence of the path of the economy. Cobb-Douglas form satisfies the properties of neo-classical production.

Equation of motion of Capital stock is given as:

$$k^{\bullet} = s.f(k) - (n + \delta).k \quad (4)$$

Substitute  $y = f(k) = Ak^{\eta}$  in equation (4)

$$k^{\bullet} = s.Ak^{\eta} - (n + \delta).k \quad (5)$$

Where  $(n + \delta)$  is the effective depreciation rate for Capital-Labor ratio.

$$k \equiv K / L.$$

Equation (5) can be written as:

$$k^{\bullet}/k = sAk^{\eta-1} - (n + \delta)$$

As we know that  $y = Ak^{\eta}$  or  $y^{\bullet} = A\eta k^{\eta-1}$

Rearranging again and get the following equation:

$$y^{\bullet} = A\eta k^{\eta} .k^{-1} \text{ Or } \quad y^{\bullet}/y = \eta(1/k)$$

$$y^{\bullet}/y = k^{\bullet}/k$$

$$y^{\bullet}/y = s.f'(k) - (n + \delta)\eta \quad (6)$$

Where  $f'(k) = A\eta k^{\eta-1}$

The above model generally mimics the following form of growth rate of output per capita which depends on the parameters of the model as:

$$y^{\bullet}/y = g(s, \eta, \delta, A, n) \quad (7)$$

In addition following Ayal and Karras (1998), Khan (2006), Aman-Ullah and Ahmed (2007) and Gulzar et al. (2010), it is assumed that aggregate productivity (A) depends on Political Instability, Corruption, Openness, Education, Inflation, Weak Institutions, Informal Activities etc. Therefore, we will assume the following:

$$A = g(PI, Corrup, Open, Edu, Inf, WI, IA, n) \quad (8)$$

Therefore,

$$y^* / y = g(s, \eta, \delta, EF, PI, WI, Informality, corrup, openness, Edu, n) \quad (9)$$

Furthermore, a number of recent studies like, Bloomberg *et al.* (2004) argued that per capita income is a significant determinant of terrorism. Therefore, the functional form is given as:

$$Terrorism = f(y^* / y) \quad (10)$$

Combining gives reduce form relationship (9) and (10) we get the final formas:

$$Terrorism = f(s, \eta, \delta, EF, PI, WI, Informality, corrup, openness, Edu, n) \quad (11)$$

Many authors used different variables for different studies (Piazza, 2006, Weinberg and Eubank 1998, Kurrid-Klitgaard *et al.* 2006). We have used all these variables to see the joint effect of these variables by adding an additional variable of corruption.

Therefore, equation (11) turns out into the testable form.

## Chapter 4

### Data, Variables and Econometric specification

In this chapter we explain the variables, nature of variables, data source and the econometric technique used in this study.

#### 4.1 Data and Variables

For estimating the parameters of the model and testing study hypothesis, we have used the data set of 36 countries covering the period from 1984 to 2008. The following variables have been taken: Terrorism (TER); corruption (COR); consumer price index (CPI); openness measured by trade to GDP ratio (OPEN); secondary school enrolment rate (EDU); growth rate of per capita (GPC) and political instability (PI). The detail of the variables and their data source is given below.

##### a. Terrorism:

The dependent variable is Terrorism which is defined as *“the premeditated use or threat of use of violence by individuals or sub national groups to obtain a political or social objective through intimidation of a large audience beyond that of the immediate victims”*. (Enders and Sandler 2006).

The index of terrorism is calculated by Political Terror Scale (PTS) ([www.pts.org](http://www.pts.org)) on the basis of political violence and terror that a country faces. The data used for this compilation of index comes from Amnesty International. This index is calculated on a 5-level terror scale. The levels are listed below.

**Level 5:** The whole population may under the threat of terror. The leaders of these societies can not pursue their personal or ideological goals.

**Level 4:** Civil and political rights violations have expanded to a large number of population. Murders, torture and disappearances are common in life. The persons who involve themselves in politics are more affected.

**Level 3:** There is a wide political imprisonment. Execution or Political murders and brutality are common. Unlimited detention for political views is accepted whether with or without trial.

**Level 2:** Imprisonment for nonviolent political activity is limited. Few persons are affected. Beating and torture are less. Political murder is rare.

**Level 1:** People are not imprisoned for their views. They are under the secure rule of law. Torture and political murders are extremely rare.

#### **b. Corruption:**

Corruption is defined as “The abuse of entrusted power for private gain. It hurts everyone who depends on the integrity of people in a position of authority” (Transparency international).

The financial form of corruption is common. It is the special form of payments and bribes connected with export and import licenses, tax assessments, exchange control, police protection or loans. Under such circumstances it is difficult to conduct business effectively. So withdrawal or withholding of investment is the ultimate choice of some firms. The index of corruption is calculated by International Country Risk Guide (ICRG). Its value ranges from one to six. One implies that a country is facing a high level of corruption while six implies that a country is a least corrupt country.

**c. Consumer Price Index (CPI):**

CPI measures the overall level of prices that shows the cost of a fixed basket of consumer goods relative to the cost of the same basket in a base year. Data on CPI is taken from World Development Indicator.

**d. Openness:**

Import is defined as the value of good and services brought into a country from any other country. Imports as well as exports are the backbone of international trade. The trade balance is negative if the value of imports is greater than the exports. Similarly exports mean the value of goods and services that are sold to another country. If the value of exports is greater than the value of imports, the country has the positive trade balance. Openness is measured as the ratio of export plus import to total GDP (Mirza and Verdier 2008). Data on Openness is taken from World Development Indicator (WDI).

**e. Education:**

Education is the transfer of knowledge and skill through teaching and research from one generation to the next generation. Some researchers used data in different studies enrollment rate- primary school enrollment rate, secondary school enrollment rate, some used literacy rate (Fretag *et al.* 2008). We have used, in this study, secondary school enrollment rate for education variable. Data on Secondary School enrolment is taken from World Development Indicators (WDI).

**f. Per Capita Growth Rate:**

GDP is the value of all the final goods and services produced within a country's boundary in a given time period. It is generally calculated on an annual basis. It is sum of all public and private consumption, government expenditure, investments and net exports within a given

territory. GDP is commonly used as an indicator of the economic health of a country, as well as to gauge a country's standard of living. Per capita GDP is calculated by dividing the GDP by total population. The data on per capita growth is taken from World Development Indicator.

**g. Political Instability:**

Political instability means that how much a system of a country is stable or unstable. For that we use the index of democracy and autocracy from the polity IV project, where democratic regime shows highly stable and autocratic regime shows highly unstable (Campos and Gassebner 2009). The polity score ranges from -10 to +10. The value of -10 indicates the hereditary monarchy and +10 indicates consolidated democracy. The term anocracy is used for the regime where elite class constantly competing for power. It is in between democracy and autocracy. The value assign to different categories is as under.

- |                     |                        |
|---------------------|------------------------|
| Fully Democracy 10  | Democracy 6to 9        |
| Open Anocracy 1to 5 | Closed Anocracy -5to 0 |
| Autocracy -10to -6  |                        |

**4.2 Econometric Specification**

Following the theoretical framework, we express terrorism (TER) as a function of corruption (COR), consumer price index (CPI), openness (OPEN), education(EDU), growth rate of per capita (GPC) and political instability (PI) as follow:

$$Terrorism = f (\text{corruption, consumer price index, openness, education, growth rate of per capita, political instability}) \dots\dots\dots(12)$$

Making this more specific and defining in terms of the variables used in this study for measuring different economic and political variables our model becomes as:

$$TER_{it} = \alpha + \beta_1 COR_{it} + \beta_2 CPI_{it} + \beta_3 OPEN_{it} + \beta_4 EDU_{it} + \beta_5 GPC_{it} + \beta_6 PI_{it} + \mu_{it} \dots \dots \dots (13)$$

Where, all the variables are defined as earlier,  $i = 1, 2, 3 \dots, N$  represent countries.  $t = 1, 2, 3 \dots, T$  represents time,  $\mu_{it}$  is the error term.

We have applied panel data analysis techniques to check our model. Panel data techniques can capture countries heterogeneity (if any) over time whereas country specific effects are ignored under the estimation of pooled ordinary least square. In such a case if the unobservable individual effects are correlated with the explanatory variables then the OLS estimates will be biased (Cheng Hsiao, 2003). Using the vector  $X_{it}$ , the explanatory variables, our empirical model with general panel data unrestricted equation can be written as:

$$TER_{it} = \alpha_0 + \mu_i + \lambda_t + \beta_{it} X_{it} + \varepsilon_{it} \dots \dots \dots (14)$$

The intercept has been divided into three parts,  $\alpha_0$  which is common to all countries and all time period,  $\mu_i$  are represented as country specific intercepts and  $\lambda_t$  are the time specific intercepts.  $\mu_i$  represents unobservable country specific effects but common for all the times.  $\lambda_t$  represents those effects which are specific to particular time period but common for all countries.  $\alpha_0$  is the mean of all these unobservable effects. Where  $\varepsilon_{it}$  is the error term which shows all those unobservable effects which varies both over time and across the cross sectional units.  $\beta_{it}$  are the slope parameters which varies across countries and over time.



The above equation cannot be estimated in this fashion, but restrictions are to be imposed. Following the tradition, we assume that the slope parameters are constant over time as well as over countries. Thus equation (14) becomes as:

$$TER_{it} = \alpha_0 + \mu_i + \lambda_t + \beta X_{it} + \varepsilon_{it} \dots\dots\dots (15)$$

Where  $\beta$  is now a vector of parameters one for each of the explanatory variable.

Rewriting equation (15) and incorporating equation (13) our final model for estimation becomes as:

$$TER_{it} = \alpha_0 + \mu_i + \lambda_t + \beta_1 COR_{it} + \beta_2 CPI_{it} + \beta_3 OPEN_{it} + \beta_4 EDU_{it} + \beta_5 GPC_{it} + \beta_6 PI_{it} + \varepsilon_{it} \dots\dots\dots (16)$$

If we introduce dummies for different regions, then the model has become as:

$$TER_{it} = \alpha_0 + \mu_i + \lambda_t + \beta_1 COR_{it} + \beta_2 CPI_{it} + \beta_3 OPEN_{it} + \beta_4 EDU_{it} + \beta_5 GPC_{it} + \beta_6 PI_{it} + \gamma_i D_i + \varepsilon_{it} \dots\dots\dots (17)$$

$D_i$  represents a vector of dummy variables for different regions. For example if  $D_1=1$  the sample countries are in South Asian region, zero otherwise.  $D_7=1$  if the sample country is Pakistan, zero otherwise. Similarly the value of  $D_8, D_9, D_{10}, D_{11}, D_{12}, D_{13}$  is set equal to one for Muslim countries, Middle East, African countries, East Asian countries, European countries and before 9/11 respectively, zero otherwise.

The slope co-coefficients do not change from country to country for all the explanatory variables. It is better to check the countries dummies as interaction terms. The countries dummies cannot be included for all explanatory variables, because it can create a problem of

degree of freedom. So, we include dummies for growth rate per capita. Then the equation can be written as:

$$TER_{it} = \alpha_0 + \mu_i + \lambda_t + \beta_1 COR_{it} + \beta_2 CPI_{it} + \beta_3 OPEN_{it} + \beta_4 EDU_{it} + \beta_5 GPC_{it} + \beta_6 PI_{it} + \eta_i GPC_{it} * D_i + \varepsilon_{it}. (18)$$

## Chapter 5

### MODEL TEST, RESULTS AND DISCUSSION

#### 5.1 Tests of the Data and Model:

While carrying out panel data estimations, it is essential to test the nature of the data and to decide a suitable estimation technique. So we need to check whether the data is stationary or not. Then to see if there exist an individual effect or we should estimate a pool equation with common intercept as well as slopes. If there exist individual effects, then it is necessary to check whether they are cross section specific or period specific or both. Next we see that the unobserved individual effects are fixed constant or randomly distributed independent of the explanatory variables.

##### 5.1.1 Panel Unit Root Tests

When we are dealing with a series that vary over time, it is necessary to verify that the series are stationary or having unit root. Because when we regress a non stationary series to another non stationary series, it will give us a spurious regression. The results about the parameters resulting from such regression may be inconsistent and biased. So the most suitable approach to investigate the stationarity of a panel series is panel unit root tests. There are two groups of panel unit root tests, one group treating the persistence parameters  $\eta_i = \eta$ , that is constant across the cross-section (the Levin, Lin, and Chu (LLC, 2002), Breitung, and Hadri tests) and the other group treat these parameters as cross-section specific (the Im, Pesaran, and Shin (IPS), Fisher-ADF and Fisher-PP tests). Each of the above tests has their own merits and demerits. The different tests can give different results for the same panel series. To be more

confident about the stationarity results we use two alternative tests for checking stationarity of the panel series, namely Andrew Levin, Chien-Fu Lin and Chia-Chang James Chu test (LLC 2002), Im-Pesaran-Shin test (IPS) and the Fisher-Augmented Dickey Fuller Chi-square test.

The results of the panel unit root tests are presented in table 5.1 below. All the tests indicate that most of the variables are stationary at level. IPS test can not reject the null of the unit root in case of EDU but the other two tests reject the null of unit root for EDU. Thus EDU is considered as stationary.

Thus our results show that all the variables are stationary at level. So, it can fairly be said that we will not face any problem of spurious results.

Table5.1 **Unit Root Test at Level**

Variable	LLC test	Prob	IPS Test	Prob	Fisher-ADF Chi-square	Prob	Conclusion
<i>TER</i>	9.9817	0.000	10.498	0.000	263.446	0.000	Stationary
<i>COR</i>	4.9044	0.000	2.580	0.005	101.512	0.008	Stationary
<i>CPI</i>	19.388	0.000	13.425	0.000	331.743	0.000	Stationary
<i>OPEN</i>	7.889	0.000	8.241	0.000	153.087	0.000	Stationary
<i>EDU</i>	4.4286	0.000	0.688	0.246	81.876	0.021	Stationary
<i>GPC</i>	12.370	0.000	16.315	0.000	441.553	0.000	Stationary
<i>PI</i>	13552.8	0.000	5293.680	0.000	81.222	0.015	Stationary

### 5.1.2 Test for Individual Effects

Country specific effects are omitted under the pooled ordinary least square estimation. In such a case, if the unobservable individual specific effects are correlated with the explanatory variables, then OLS estimates will be biased (Cheng Hsiao, 2003). Revisit equation 14,

$$TER_{it} = \alpha_0 + \mu_i + \lambda_t + \beta X_{it} + \varepsilon_{it} \dots\dots\dots (17)$$

If we are going for the test for individual effect, then we can impose three types of restrictions on the unrestricted model mentioned above as:

$$TER_{it} = \alpha_0 + \lambda_t + \beta X_{it} + \varepsilon_{it} \dots\dots\dots (18)$$

If we assume that there are no cross section specific effects, we consider the time specific effects and then the null hypothesis which is tested is:

$$H_0 : \mu_1 = \mu_2 = \mu_3 = \dots = \mu_N = 0$$

Under  $H_0$  the residual sum of square ( $RSS_R$ ) of the restricted (18) divided by the variance ( $\delta_\varepsilon^2$ ) follow chi-square distribution with  $NT - (2K + 1)$  degrees of freedom, and the residual sum of square ( $RSS_U$ ) of the unrestricted model (17) divided by the variance follow chi-square distribution with  $N(T-1) - 2K$  degrees of freedom.  $\frac{RSS_U}{\delta_\varepsilon^2}$  is independent of  $\frac{RSS_R - RSS_U}{\delta_\varepsilon^2}$  which

follow chi-square distribution with  $N - 1$  degrees of freedom. The F-test under  $H_0$  is

$$F = \frac{(RSS_R - RSS_U)/(N - 1)}{RSS_U/[N(T - 1) - 2K]} \dots\dots\dots (19)$$

If F-test with  $N-1$  and  $N(T-1)-2K$  degrees of freedom is insignificant, the null hypothesis will be rejected. And we will have to estimate a model with cross section specific terms. The second

restriction on the model that can be imposed is that there is no time specific effect i.e. time effects equal to zero. The model with cross section effects is given as:

$$TER_{it} = \alpha_0 + \mu_i + \beta X_{it} + \varepsilon_{it} \dots\dots\dots (20)$$

And then test the following hypothesis

$$H_0 : \lambda_1 = \lambda_2 = \lambda_3 = \dots = \lambda_T = 0$$

By using the following F-Test

$$F = \frac{(RSS_R - RSS_U)/(T - 1)}{RSS_U/[N(T - 1) - 2K]} \dots\dots\dots (21)$$

We reject the null hypothesis if the F-test with T-1 and N(T-1)-2K degrees of freedom is significant. Then we will consider the time specific effects in our estimations. We can not reject the null hypothesis if F statistics is insignificant, then we can ignore the time specific effects. In the final restriction we treat the model with no cross section effects and no time effects. This type of model is called common effects model.

$$TER_{it} = \alpha_0 + \beta X_{it} + \varepsilon_{it} \dots\dots\dots (22)$$

And then test the following hypothesis

$$H_0 : \mu_1 = \mu_2 = \mu_3 = \dots = \mu_N = 0, \lambda_1 = \lambda_2 = \lambda_3 = \dots = \lambda_T = 0$$

By using the following F-test

$$F = \frac{(RSS_R - RSS_U)/(N - 1) + (T - 1)}{RSS_U/[N(T - 1) - 2K]} \dots\dots\dots (23)$$

If F-test statistic with  $(N-1)$  and  $(T-1)$  and  $N(T-1) - 2K$  degrees of freedom is significant, we reject the null hypothesis and conclude that the common effects model is not the correct choice.

Table 5.2 **Tests for Individual Effects**

Effects Test	Statistic	d.f.	Prob.	Conclusion
Cross-section F-statistic	24.83	(29, 483)	0.0000	Reject $H_0$ of redundancy
Cross-section Chi-square	495.59	29	0.0000	Reject $H_0$ of redundancy
Period F-Statistic	1.97	(24, 483)	0.0042	Reject $H_0$ of redundancy
Period Chi-Square	50.81	24	0.0011	Reject $H_0$ of redundancy
Cross-Section/Period F	14.78	(53, 483)	0.0000	Reject $H_0$ of redundancy
Cross-Section/Period Chi-square	523.50	53	0.0000	Reject $H_0$ of redundancy

In order to test for the individual effects in E-Views, first the unrestricted specification of the model with two way fixed effects is estimated.

The results of individual effect tests are presented in table 5.2 above. Both of the F-test and chi-square indicates that there is a presence of both cross section specific and period specific effects.

Then we conducted separate tests. In one case our unrestricted model is the one with cross

section fixed effects only and in the second case our unrestricted model is with period effects only. Our results are strongly in favor of a model with both cross-section and time specific effects. Therefore, we have proceeded the model that has both cross section specific (country specific) and period specific effects.

### 5.1.3 Hausman Test- Fixed Effects versus Random Effects:

In the previous section, the model with both period specific and cross section specific unobservable effects, is discussed. Now we will have to determine whether these unobservable are fixed constant correlated with explanatory variable (Fixed Effects Model) or randomly distributed independent of the explanatory variables (Random Effects Model). There is no difference between the Fixed effects and Random Effects when time period is large, because in this situation the Generalized Least Square (GLS) and Least square dummy variable (LSDV) become the same (Cheng Hsiao, 2003). When number of cross section are larger than the number of time periods, then it create a major difference among the estimates of the parameters, whether it is treated as fixed effect or random effects. In our study number of cross section are greater than the number of time periods. So, we should be very careful while deciding about the random effects or the fixed effects.

Hausman (1978) formulated the test to distinguish between the Random Effects Model and the Fixed Effects Model. If the cross section specific effects are correlated with the explanatory variables, then the Fixed Effects model is an appropriate choice and Random Effects Model is inconsistent. If the individual specific effects are randomly and independently distributed of the explanatory variables, then the Fixed Effects are inconsistent and the Random Effects Model is the correct choice.



The null hypothesis states that there is no significance difference between the Fixed Effects and the Random Effects estimators. If the difference is significant then this is interpreted as evidence in favor of Fixed Effects or against Random Effects. To test the null hypothesis we use the chi-square statistic as given below.

$$\chi_{df}^2 = \left( \hat{\beta}_{FE} - \hat{\beta}_{RE} \right)' \left[ \text{var}(\hat{\beta}_{FE}) - \text{var}(\hat{\beta}_{RE}) \right]^{-1} \left( \hat{\beta}_{FE} - \hat{\beta}_{RE} \right) \dots\dots\dots Q4)$$

Where  $\left( \hat{\beta}_{FE} \right)$  is the co-efficient of the fixed effects and  $\left( \hat{\beta}_{RE} \right)$  is the co-efficient of random effects.  $\left[ \text{var}(\hat{\beta}_{FE}) \right]$  and  $\left[ \text{var}(\hat{\beta}_{RE}) \right]$  are the variances of fixed effects and random effects respectively.

Under the null and alternative hypothesis the Fixed Effects estimators are consistent. Under the null hypothesis the random effects estimators are more efficient but under the alternative hypothesis it is inconsistent. If the null hypothesis is rejected, it means that at least some of the explanatory variables are correlated with the individual specific effects. So, the fixed effect model is preferred in our study as suggested by Hausman test.

In order to perform Hausman test, first effect model is estimated. Then Chi-square statistic is used to test our null hypothesis of independent individual effects. Our study incorporates two way effects. So we have to decide both the cross-section and time specific effects as fixed or randomly distributed. The results of the tests are presented below.

Table 5.3

**Hausman Test**

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	19.46	6	0.0034
Period-random	14.03	6	0.0293

According to table 5.3, it is clear that the probability  $0.0034 < 0.05$  and  $0.029 < 0.05$ . So, our null hypothesis of independent individual effects are rejected in favor of alternative hypothesis. Thus our Hausman tests result for this specification favor two way fixed effects model as the correct specification.

**5.2 Empirical Results and Discussion:**

After the specification of our model now we come to the discussion of our econometric findings.

Table 5.4

<u>Variable</u>	<u>co efficient</u>	<u>Standard Error</u>	<u>Probability</u>
Constant term	3.914498	0.25588	0.0000
Corruption	-0.076228***	0.039917	0.0568
Consumer Price Index	0.000338**	0.000137	0.0143
Openness	0.194775*	0.057778	0.0008
Education	-0.007116**	0.003301	0.0316
Growth Per Capita	-0.024156*	0.009107	0.0083
Political Instability	-0.019016**	0.008123	0.0196
R-Square	0.6751		
Adjusted R-Squared	0.6354		
<u>F-Statistic</u>	<u>17.0138</u>		

\*significant at 1%; \*\*significant at 5%;\*\*\*significant at 10%

Our first variable that we expect to affect the terror activities is corruption. First of all note that the index of corruption ranges from one to six, where the value six imply that the corresponding country is least corrupt and one indicate the higher degree of corruption. Now look at the result of table 5.4, the coefficient of corruption index is negative and statistically significant. This implies that if the index of corruption increases by one unit (where one unit increase in corruption index means one unit decrease in corruption) it will decrease terror activities by 0.076 units on average. Thus our results suggest positive relation between corruption and terror activities in the sample countries. The result that higher corruption leads to more terror activities seems quite plausible. More corruption in any society means that the elite class of the society in question may be able to meet their illegal demands by lobbying and bribing the authorities, while the poor may not be able to get their legal and ethical rights due to their backward financial background. If such a phenomenon tends to exist in any society over a period of time, it will create a sense of deprivation and frustration among the poor. And this sense of deprivation and exploitation among the poor may very well lead them to get their rights by use of any source that they can afford.

The second variable statistically significant is consumer price index (CPI). The coefficient of CPI indicates that higher inflation in the sample countries will lead to more terror activities on average. Inflation erodes real purchasing power of the people. The poor segment of the society is more vulnerable to rising inflation compared to elite class and they are forced down to the poverty trap. Under such circumstances the opportunity cost of life reduces making terrorism a plausible course of action for the poor to achieve necessary resources. In fact many

will tradeoff their lives to generate financial resources for their families which pursue them for terrorist acts (Shahbaz, M., and M. Shahbaz Shabbir, 2011).

The coefficient shows that one unit increase in consumer price index leads to increase the terror index by 0.00034 units on average. This means that higher prices will lead to higher terror activities. This result matches the stylized fact that most of the time more violence and tension has been observed in the developing world as compared to the advanced countries (Shahbaz, M and Shabbir 2011).

Third variable is trade openness which is measured as the ratio of export plus import to GDP. This is also referred as the degree of exposure to economic integration. Our results indicate a positive and significant relation between openness and terrorism. It means that higher level of integration may lead to more terror activities. The co-efficient show that one unit increase in trade openness will lead to increase the terrorism by 0.19 units. The reason behind this argument is that high degree of economic integration enhances people's interaction and movement easy across the countries. In the given circumstances terrorists or banned organizations may enter the country and initiate terrorist activities. The study of Burgoon (2006) also finds the co-efficient positive but insignificant. Another study by Kurrild-Klitgard (2006) and Blomberg and Hess (2008a) find the negative relation between economic integration and the terrorism. It means that higher level of economic integration reduce the terrorist activities. Fretag et al. (2008) find that in more developed countries the trade openness leads to more terrorism. But in less developed countries trade openness is negatively affect the terror activities. So there is a need for further clarification about trade openness or economic integration on terrorism.

The fourth variable is education. The coefficient of education shows that increase in the rate of secondary school enrollment has negative and significant effect on terrorism activities in the sample countries. The coefficient of education shows that if education increases by one unit the terror will decrease by 0.0071 units. The reason is that higher education lead to improvement in human resource development that can enhance the living standard by increasing the per capita income. The opportunity cost of committing terror increases which forces them to restrain from these activities. The result supports the findings of Azam and Thelen (2008) that higher secondary school enrolment has a negative relation with terrorism. In contrast Kurrild-Klitgaard et al. (2006) finds that higher level of overall education tend to encourage terrorism but insignificantly. The diversity of results may result from the use of different indicators of education, i.e. education measures.

The fifth variable that is usually perceived as a determinant of terror activities in any society is the income position of the individuals living in the society. Income and sources of income of individuals play very important role in influencing the standards of living and attitude of people toward society. If one enjoys good income status in the society then it will be very hard for him to engage himself in activities that are considered unethical and unfair in the society because the opportunity cost for such individuals to indulge in such activities will be very high. Keeping in view this fact, we have included this variable, growth rate of per capita income in our study as an explanatory variable. The coefficient shows that one unit increase in growth of income leads to decrease the terror index by 0.024 units on average. This means that higher income will lead to less terror activities. This result matches the stylized fact that most of the time more violence and tension has been observed in those countries where per capita income is

low or where people are less educated. Thus these results are significant and according to the hypothesis.

Our sixth variable is political instability. The value of this variable ranges from -10 to +10 indicating highly instable to highly stable respectively. Results indicates that one unit increase in the index of political instability leads to decrease the terror index by 0.019 points on average and is highly significant. Note that an increase in the index of political instability means less instability (more stable political government) and a decrease in terror index implies reduction in terrorist activities by construction of the index. Thus this result suggests negative relation between terror activities and political instability in the sample countries. The result that terror activities can be reduced by creating more stable political institutions seems quite plausible. If the political environment of a country is stable it can lead to peace and harmony through different channels. For example, stable political environment can create stable economic environment in the country, leading to better financial and economic activities in the country. Such activities will lead to increase domestic and foreign investment and production. Due to increase in production more employment and income will be generated. The increase in income will lead to peace and harmony in the society. Also stable political institutions are likely to be more credible among the masses and if any dispute arises in the country, the political leaders are better able to solve it peacefully because people are ready to trust on such leaders. This result matches the findings of Lia (2007) and Piazza (2008a) who have found that more unstable and insecure political set up will be accompanied by more conflicts and terror activities.

**Table: 5.5 Dummy Variables Analysis: Intercept.**

**Dependent Variable: Terrorism**

Variables	Model1	Model2	Model3	Model4	Model5	Model6	Model7	Model8
CORRUPTION	0.257** (0.023)	0.285** (0.020)	0.280** (0.027)	0.324** (0.036)	0.270** (0.023)	0.289** (0.02)	0.255** (0.022)	0.281** (0.021)
CPI			0.003*** (0.000)		0.003*** (0.000)			0.0003*** (0.00008)
OPENNESS	-0.278** (0.0463)	-0.317** (0.0464)	-0.345** (0.0449)	-0.157* (0.0692)	-0.348** (0.0430)	-0.297* (0.063)	-0.253* (0.0564)	-0.329** (0.043)
EDUCATION				-0.0035*** (0.0017)				
GROWTH PER CAPITA	-0.014*** (0.005)	-0.015*** (0.005)					-0.014*** (0.0053)	
POLITICAL INSTABILITY	-0.013*** (0.0033)	-0.011*** (0.0034)	-0.011*** (0.0036)		-0.010*** (0.004)	-0.0112*** (0.0034)	-0.0035*** (0.0029)	-0.0072*** (0.0035)
D1(SA)	0.514*** (0.000)							
D7(PAK)		0.0373 (0.7584)						
D8(MUS)			-0.089* (0.150)					
D9(ME)				0.4581*** (0.000)				
D10(AFR)					-0.065 (0.241)			
D11(EA)						-0.0785 (0.4712)		
D12(EU)							-0.795*** (0.000)	
D13(B9/11)								0.0673 (0.312)
Constant	4.165 (0.088)	4.319 (0.080)	4.377 (0.117)	4.407 (0.151)	4.326 (0.093)	4.333 (0.0769)	4.280 (0.0797)	4.2765 (0.0988)
R-Square	0.2318	0.1963	0.1859	0.1976	0.1852	0.1970	0.2424	0.1854
Ad. R-Square	0.2266	0.1920	0.1800	0.1920	0.1794	0.1927	0.2372	0.1795

\*\*\* Significant at 1% , \*\* Significant at 5%, \* Significant at 10%

Values in brackets are p-values.

### 5.2.1 Dummy Variable Analysis on Different Region:

We introduce regional dummies to capture the differences among different regions and time (Singh and Jun 1995). The inclusion of these regional and time dummies have special

justification in our study as terrorism effects are the region and time specific. We introduce dummies for South Asian Countries, Pakistan, Muslim Countries, Middle East Countries, African Countries, East Asian Countries, European Countries, and Before 9/11. The dummy for South Asian countries is 1 and zero otherwise. Similarly the dummy for Pakistan, Muslim countries, Middle East Countries, African countries, East Asian countries and European countries is set equal to 1 for each otherwise zero. The time dummy before 9/11 is 1 otherwise zero. Table 5.5 Shows the results after incorporating dummies in our estimations. Here we will discuss the coefficients of dummies. The rest of the results have been discussed in greater details in previous section 5.1.4. The dummy for South Asian countries enters significantly ( $p=0.000$ ) with positive sign suggesting that, *ceteris paribus*, South Asian countries will face terrorism 0.514 times more than other countries in the sample. The South Asia is the most populous region of the world having population over 1470 million people. This region remained the main victim of terrorism for the last three and a half decades. The presence of separatist groups such as Tamil Tigers in Sri Lanka, Sikh separatist movement in India and Baluchistan Liberation Army (BLA) in Pakistan has made these countries the major victims of terrorism. Pakistan has been blamed for providing safe heaven to terrorist (Nasir, M., *et al.* 2011). Dummy for Pakistan also have a positive sign but insignificant ( $p=0.7574$ ). It means that Pakistan, *ceteris paribus*, will face 0.037 more terror than other countries in the sample. Pakistan is the ally fighting against terrorist at the Afghan borders and other militants in the tribal areas. The other militant groups (Al Quaida, Taliban etc) are also active in Pakistan. That is the main reason that Pakistan is more prone to terror activities. The dummy for the sample of Muslim countries shows a negative sign and is significant ( $p=0.150$ ). The value -0.089 means that the Muslim countries, *ceteris paribus*, will face 0.089 times less terrorism than the sample countries. The sample of Muslim countries



include, Cameroon, Nigeria, Morocco, Tunisia, Libya, Iran, Bangladesh, Turkey, Iraq, Egypt, Syria, Saudi Arabia, Bahrain, Pakistan, Malaysia and Indonesia. In this sample two countries are South Asian, two are East Asian, six are Middle East and eight are African countries. Some countries in the sample of Muslim countries like Egypt, Syria, Saudi Arabia and Bahrain have been under the control of king or autocratic regimes. They have full control over the government during the sample period times. Some East Asian like Malaysia and Indonesia have stable governments for a long time to serve. So the impact of these countries in total sample offset the positive overall effect. The dummy for Middle East enters significantly ( $p=0.0001$ ). The countries include Iran, Turkey, Syria, Bahrain, Saudi Arabia and Iraq. This region, *ceteris paribus*, will face 0.0458 times more terrorism than the overall sample. Africa, East Asian and European countries, *ceteris paribus*, will face less terrorism by 0.065 times, 0.0782 times and 0.794 times respectively than the sample countries. The African countries are Cameroon, Nigeria, Kenya, South Africa, Morocco, Tunisia, Libya, Sudan and Egypt. In African countries sample, some countries are autocratic that may lead to full control over the affairs of the government and terror activities. Similarly East Asian countries, China, Thailand, Malaysia, Indonesia, Singapore, Philippines, may also less prone to terrorism due to stability in the region. European countries that include Bulgaria, Romania and UK have high value of coefficient showing less terror activities in that region.

**Table: 5.6 Dummy Variable Analysis: Slope**

**Dependent Variable: Terrorism**

Variables	Model1	Model2	Model3	Model4	Model5	Model6	Model7	Model8
CORRUPTION	-0.075* (0.063)	-0.076* (0.056)	-0.076* (0.055)	-0.077* (0.0546)	-0.067* (0.08)	-0.0701* (0.085)	-0.0745* (0.075)	-0.087** (0.033)
CPI	0.0004** (0.013)	0.0003** (0.014)	0.0003** (0.012)	0.0004** (0.012)	0.0002 (0.121)	0.0004*** (0.0095)	0.0003*** (0.0097)	0.0003*** (0.0080)
OPENNESS	-0.190*** (0.0013)	0.195*** (0.0008)	0.199*** (0.0003)	-0.184*** (0.0012)	0.23*** (0.0000)	0.196*** (0.0004)	0.185*** (0.0003)	-0.177*** (0.0015)
EDU	-0.0067* (0.0534)	-0.0071** (0.0317)	-0.0074** (0.0281)	-0.0065** (0.048)	-0.0085** (0.0116)	-0.0073** (0.0256)	-0.0067** (0.046)	-0.0059* (0.071)
GROWTH PER CAPITA	-0.021** (0.0405)	-0.024*** (0.0089)	-0.0265** (0.025)	-0.0169 (0.116)	-0.041*** (0.000)	-0.0196* (0.0655)	-0.026*** (0.0081)	-0.082*** (0.0000)
POLITICAL INSTABILITY	-0.0196** (0.0171)	-0.019** (0.018)	-0.0186** (0.017)	-0.0195** (0.018)	-0.0177** (0.034)	-0.0186** (0.023)	-0.0192** (0.016)	-0.0196** (0.0196)
D1(SA)*GPC	-0.0356 (0.119)							
D7(PAK)*GPC		-0.0108 (0.878)						
D8(MUS)*GPC			0.0052 (0.674)					
D9(ME)*GPC				-0.0357** (0.0464)				
D10(AFR)*GPC					0.069*** (0.0002)			
D11(EA)*GPC						-0.0241 (0.1536)		
D12(EU)*GPC							0.0085 (0.658)	
D13(B9/11)*GPC								0.0678*** (0.000)
Constant	3.898 (0.000)	3.9159 (0.000)	3.9287 (0.000)	3.8777 (0.000)	3.9669 (0.000)	3.9153 (0.000)	3.8945 (0.000)	3.9383 (0.000)
R-Square	0.6767	0.6751	0.6752	0.6778	0.68631	0.67629	0.6753	0.6836
Ad. R-Square	0.6362	0.6347	0.6348	0.6377	0.6473	0.6360	0.6349	0.6442

\*\*\* Significant at 1% , \*\* Significant at 5%, \* Significant at 10%

### 5.2.2 Dummy Variable Analysis: Slope

Now we introduce slope dummies for growth rate per capita for these regions. Dummy for South Asian countries is D1. The value shows that one unit increase in per capita in South Asian countries will decrease the terror activities by 0.036 units keeping all other variables constant.

The results are according to our hypothesis as it is negatively correlated with terrorism but insignificant ( $p=0.1189$ ). Dummy for Pakistan has a negative sign but insignificant. The result for Pakistan indicates that an increase in one unit of per capita growth will lead to decrease the terror activities by 0.011 units. These results are also insignificant ( $p=0.8781$ ). The insignificance of the results shows that there are some other religious and political factors that cause terror activities. The dummy (D8) for Muslim countries show positive relation between per capita GDP and terrorism but insignificant. For the Middle East countries dummy (D9) indicate negative and significant ( $p=0.0464$ ) relation. The value for Middle East shows that an increase of one unit in GPC will decrease the terror activities by 0.0355 units. The results matches the results of Caruso and Schneider (2011) and Testas (2004) that shows negative association between per capita GDP and terrorism. The increase in GDP in Iran and Iraq initially lead to reduction in terrorist activities, when the people of these countries have more money in their pockets, they go toward well education as well as status that make them more learned and well aware . They are discouraged by such activities and terrorism decreases. But when Middle East are employed with other Muslim countries, it changes the sign and significance as mentioned by D8. For African countries the dummy (D10) shows a positive relation and highly significant ( $p=.0002$ ). For the East Asian countries, dummy (D11) shows the negative relation but insignificant ( $p=0.1536$ ). The coefficient shows that an increase in one unit in GPC will decrease the terror activities by 0.024 units. The countries such as Singapore, Malaysia are high income countries make less attractive for the people to be involved in terrorist activities due to high opportunity cost but the countries such as Indonesia make this relationship insignificant due to low opportunity cost. Dummy for European countries is D12 which shows positive relation and highly insignificant ( $p=0.6558$ ). It means that in European countries per capita of the people does

not play any role to produce terror activities. In European countries there always have been attraction for the people of developing countries to enter and promote their activities in order to earn that is associated with terrorism. In the meanwhile, well established policies of European countries toward foreign issues and terrorism discourage them and make this relationship insignificant. Dummy for time i.e. before 9/11 is represented by D13. The results indicate the positive relation between per capita GDP and terror activities. These results are significant ( $p=0.000$ ). In countries such as developed, higher GDP lead to more attraction for terrorism activities and in developing countries more energy of residents is wasted toward terrorism. On the whole our sample of 36 countries take both developed as well as developing countries. In developed countries this relation is strongly discouraged and does not promote terrorism but in developing countries this relation is encouraged and making the whole sample insignificant.

## Chapter 6

### Conclusion and Policy suggestions

This study has sought to quantify empirically the factors that can affect terrorism in the world. The study was particularly inspired by the work of Blomberg and Hess (2004) who have investigated the link between the terrorist activities and the country's economy. We have extended their work by using a larger sample of countries and testing for the role of additional variables, namely, corruption, consumer price index, openness, education, per capita income and political instability. The study covers the period from 1984 to 2008. We have used panel data estimation with fixed effect estimation technique. Our result indicates that corruption is one important factor that influencing terrorist activities in the sample countries. The co-efficient of corruption shows that one unit change in the index of corruption leads to increases terror activities by 0.07 units on average. The reason for this relation is that corruption in any society always leads to injustice and sense of deprivation among the poor class of the society which ultimately force them for using unfair means to get their due rights. The results indicate that one unit change in growth rate of per capita income bring about 0.024 units change in terror activities. The relation is negative and highly significant. The reason for the relation is that income and sources of income of individuals play very important role in influencing the way of living and attitude of people toward society. If one enjoys good income status in the society then it will be very hard for him to engage himself in activities that are considered unethical and unfair. The enhancing of living standard of the people can increase the opportunity cost of involving in the terror activities. Political instability exerts that stable governments lead to less terror activities while instable countries are more prone to terrorism. Results indicates that one unit increase in the index of political instability lead to decrease the terror index by 0.019 points

on average and is highly significant. Politically stable environment may lead to peace and harmony in the country which ultimately lead to stable economic environment in the country. The stable economic environment in a country may create employment opportunities through increased domestic and foreign investment. Increase in per capita income, due to more employment, may increase the opportunity cost for the people to be involved in terror activities. Consumer price index and openness are positive determinants of terrorism. CPI indicates that higher inflation in the sample countries may reduce the real purchasing power of the poor segment of the society that force them to involve in the terror activities due to lowering the opportunity cost. Openness enhances people's interaction and movement easy across the countries. In the given circumstances terrorists or banned organizations may enter the country and initiate terrorist activities. Another reason for the positive effect may be the increasing tendency of world power to get access to the resources of other countries. The gain from trade occurs at the expense of other countries may also be a source of conflict. Another variable is education which is negatively associated with terrorism. Higher education may lead to improvement in human resource development that can enhance living standard of the people. It increases the opportunity cost of participating in terror activities.

Keeping in view the above results, the one possible policy measure for controlling terrorist activities may be good governance. From good governance means that the state machinery could take strong measures for controlling corruption and providing equal economic and social opportunities to the population in general and the deprived class in particular. As far as the question of controlling terror activities is concerned, quality education can be very critical factor. Quality education will not only provide the income generating opportunities for the poor but also create awareness among them from being trapped by the anti state agents. Political

Instability remains one of major problem for most of the developing countries. If these countries want to develop peaceful societies, then they have to create an environment of political tolerance. At this stage, it is the high time for the international community to base the international, social and economic relation interaction on fair and mutual interest rather than gaining benefits at the expense of the other countries. Of all these factors the most important one is the poverty. One possible measure, particularly for the developing countries, is to formulate policies in such a way that poverty could be curtailed as long as possible and keep the inflation in a manageable limit.

## References

Abadie, Alberto, 2004. Poverty, political freedom and the roots of terrorism. *NBER WP* 10859.

Abadie, Alberto, and Javier Gardeazabal. 2008. Terrorism and the world economy. *European Economic Review* 52(1): 1–27.

1. Abadie, Alberto and Javier Gardeazabal. (2003).” The economic cost of conflict: A case study of the basque country”. *American Economic Review* 93(1): 113-132.
2. Abadie, A. (2006). “Poverty, political freedom, and the roots of terrorism,”*American Economic Review*, 96(2), 50–56.
3. Abadie, A., and Gardeazabal, J. (2008). “Terrorism and the world economy,”*European Economic Review*, 52, 1–27.
4. Azam, J.-P., and Thelen, V. (2008). The roles of foreign aid and education in the war on terror. *Public Choice*,135, 375–397.
5. Addison, T., and Murshed, S. M. (2005). “Transnational terrorism as a spillover of domestic disputes in other countries,” *Defence and Peace Economics*, 16(2), 69–82.
6. Baltagi, H. B. (2005), “Econometric Analysis of Panel Data”, 3<sup>rd</sup> Edition, *John Wiley & Sons, Ltd.*
7. Blomberg, S.B., and Hess, G.D., (2002). “The Temporal Links Between Conflict and Economic Activity”. *Journal of Conflict Resolution* 46, 74-90.
8. Blomberg, S. B., Hess, G. D., and Weerapana, A. (2004), “Economic conditions and terrorism,” *European Journal of Political Economy*, 20: 463–478.
9. Blomberg, Brock S., Gregory D. Hess, and Athanasios Orphanides. (2004a). “The macroeconomic consequences of terrorism”. *Journal of Monetary Economics* 51(5): 1007–1032.



10. Blomberg, Brock S., Gregory D. Hess, and Akila Weerapana. (2004b). "Economic conditions and terrorism". *European Journal of Political Economy* 20(2): 463–478.
11. Blomberg, Brock S. and Gregory D. Hess. (2006). "How much does violence tax trade?" *Review of Economic and Statistics* 88(4): 599–612.
12. Burgoon, B. (2006). "On welfare and terror: social welfare policies and political-economic roots of terrorism," *Journal of Conflict Resolution*, 50(2), 176–203.
13. Campos, N. F., and Gassebner, M. (2009). *International terrorism, political instability and the escalation effect*. Discussion Paper 4061, IZA.
14. Caruso, R., and Schneider, F., (2011). "The Socio-economic determinants of terrorism and political violence in Western Europe (1994-2007)," *European journal of political economy*, 27(2011) s37-s49.
15. Enders, W., Sandler, T., and Cauley, J., (1990). "Assessing the Impact of Terrorist-Thwarting Policies: An Intervention Time Series Approach". *Defence Economics* 2, 1-18.
16. Enders, W., Sandler, T. and Parise, G., (1992). "An Econometric Analysis of the Impact of Terrorism and Tourism". *Kyklos* 45, 531-54.
17. Feige, E. L. (1979), "How big the irregular economy?," *Challenge*, Vol. 12, pp. 163-188
18. Freytag, A., Krüger, J. J., Meierrieks, D., and Schneider, F. (2008). "*The origins of terrorism: Cross-country estimates on socio-economic determinants of terrorism*," CIE Working Paper 2009-01, University of Paderborn.
19. Gurr, T. (1968). Psychological factors in civil violence. *World politics* 20, 245-278.
20. Gurr, T. (1970). *Why men rebel*. Princeton: Princeton University Press.
21. Hausman, J. A. (1978), "Specification Tests in Econometrics, *Econometrica*, vol.46, pp.1251-1271

22. Hsiao, C. (2003), "Analysis of Panel Data", 3<sup>rd</sup> Edition, *Cambridge University press*
23. Hussain, A. (2003), "*Terrorism, Development and Democracy: The Case of Pakistan*,"  
Terrorism in South Asia, Shipra Publications, India, 2003.
24. Hussain, A. (2010), "*Power Dynamics, Institutional Instability and Economic Growth: The Case of Pakistan*," The Asia Foundation, April 2010.
25. Im K. S., Pesaran M. H., & Shin, Y. (2003), "Testing for Unit Roots in Heterogeneous Panels" *Journal of Econometrics*, vol.115 (revise versions of 1997 work) pp.53-74
26. Krueger, A. B., and Maleckova, J. (2003). "Education, poverty and Terrorism: Is there a causal connection?," *Journal of Economic Perspectives*, 17(4), 119–144.
27. Kurrild-Klitgaard, P., Justesen, M. K., & Klemmensen, P. (2006). "The political economy of freedom, democracy and transnational terrorism," *Public Choice*, 128, 289–315.
28. Levin, A., Lin, C. F., and Chu, C. J. (2002), "Unit Root Tests in Panel Data: Asymptotic and Finite- Sample Properties", *Journal of Econometrics*, vol.108, (revise version of 1992 Work) pp.1-24
29. Li, Q., and Drew Schaub (2004) "Economic Globalization and Transnational Terrorism: A Pooled Time-Series Analysis". *Journal of conflict Resolution*, Vol. 48 No.2, April 2004 230-258
30. Mirza, D., and Verdier, T. (2008). "International trade, security and transnational terrorism: theory and a survey of empirics," *Journal of Comparative Economics*, 36, 179–194.
31. Nasir, M., Ali, Amanat, and Faizur Rehman, (2011). "Determinants of Terrorism: A panel data analysis of selected South Asian countries," *The Singapore economic review*. Vol. 56. No. 2 (2011) 175-187.

32. Nitsch, V., and Schumacher, D. (2004). Terrorism and international trade: an empirical investigation. *European Journal of Political Economy*, 20, 423–433.
33. Piazza, James A,(2006). “Rooted in Poverty?: Terrorism, Poor Economic Development, and Social Cleavages,” *Terrorism and Political Violence*, 18: 159-177.
34. Shahbaz, M., Shabbir, M. S.,(2011). “Is hike in inflation responsible for rise in terrorism in Pakistan?,” MPRA paper, Munich (28 April, 2011).
35. Qureshi, M. N. and K .Ali (2010), “*Political Instability and Economic Development: Pakistan Time-Series Analysis*”, *International Research Journal of Finance and Economics*, ISSN 1450-2887, Issue 56 (2010).
36. Sandler, T., and Enders, W. (2004). “An economic perspective on transnational terrorism,” *European Journal of Political Economy*, 20, 301–316.
37. Shabbier, G. and M. Anwar (2007), “Determinants of Corruption in Developing Countries”, *The Pakistan Development Review*, Vol.46, No. 4, Part II (Winter 2007), pp. 751–764.
38. Shahbaz, M., Shabbir, M. S.,(2011). “Is hike in inflation responsible for rise in terrorism in Pakistan?,” MPRA paper, Munich (28 April, 2011).
39. Shahbaz, M., Malik, S., and Shabbir, M. S.,(2011). “Does economic growth cause terrorism in Pakistan?, MPRA paper,” Munich (20 November, 2011).
40. Shabbir, G. and M. Anwar (2007), “Determinant of Corruption in Developing Countries”, *The Pakistan Development Review*, Vol.46, No. 4 (Winter 2007), pp 751 – 764.
41. Stock, H. J., and Watson, W. M. (2008), “Heteroskedasticity-Robust Standard Errors for Fixed Effects Panel Data Regression”, *Econometrica*, vol.76 (1), pp.155-174
42. Testas, A. (2004). “Determinants of terrorism in the Muslim world: an empirical cross-sectional analysis,” *Terrorism and Political Violence*, 16(2), 253–273.

43. Weinberg, L. B., and Eubank, W. L. (1998). "Terrorism and democracy: what recent events disclose," *Terrorism and political violence*, 10(1), 108-118.
44. White, H. (1980), "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity", *Econometrica*, vol.48 (4), pp.817-838
45. [www.systemicpeace.org/polity/polity4.htm](http://www.systemicpeace.org/polity/polity4.htm)
46. [www.politicalterroryscale.org](http://www.politicalterroryscale.org)
47. <http://www.prsgroup.com/icrg.aspx>
48. <http://databank.worldbank.org>

**Appendix:**

**List of all sample Countries:**

United States	Turkey	Mexico	Iraq
Colombia	Egypt	Brazil	Syria
Chile	Israel	Argentina	Saudi Arabia
United kingdom	Bahrain	Bulgaria	China
Romania	India	Cameroon	Pakistan
Nigeria	Bangladesh	Kenya	Myanmar
South Africa	Sri Lanka	Morocco	Thailand
Tunisia	Malaysia	Libya	Singapore
Sudan	Philippines	Iran	Indonesia

**European Countries:**

United Kingdom	Romania	Bulgaria
----------------	---------	----------

**Muslim Countries:**

Cameroon	Iraq	Indonesia	Turkey
Morocco	Syria	Nigeria	Egypt
Libya	Bahrain	Tunisia	Saudi Arabia
Iran	Bangladesh	Sudan	Pakistan

			Malaysia
--	--	--	----------

**Middle East Countries:**

Iran	Saudi Arabia	Syria
Iraq	Turkey	Bahrain

**African Countries:**

Cameroon	Libya	South Africa
Kenya	Egypt	Tunisia
Morocco	Nigeria	Sudan

**South Asian Countries:**

India	Sri Lanka	Myanmar
Bangladesh	Pakistan	

**East Asian Countries:**

Thailand	Singapore	Indonesia
Malaysia	Philippines	

Redundant Fixed Effects Tests

Equation: FIXED\_EFFECT

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	24.832776	(29,483)	0.0000
Cross-section Chi-square	495.586414	29	0.0000
Period F	1.974053	(24,483)	0.0042
Period Chi-square	50.809555	24	0.0011
Cross-Section/Period F	14.785106	(53,483)	0.0000
Cross-Section/Period Chi-square	523.497162	53	0.0000

Correlated Random Effects - Hausman Test

Equation: FIXED\_EFFECT

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	19.466015	6	0.0034

Correlated Random Effects - Hausman Test

Equation: FIXED\_EFFECT

Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	14.033348	6	0.0293