

Crime and Economic Growth in Developing Countries: Evidence from Pakistan

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ABSTRACT

This study investigates the impact of crime on economic growth of Pakistan by using time series data from 1980 to 2011. Augmented Dickey Fuller (ADF) test is applied to check the stationarity of variables. It is hypothesized that increase in crime leads to less economic growth in Pakistan. Autoregressive Distributive lag (ARDL) to cointegration is used to find short and long run relationship between crime and Economic growth. Results reveal that crime has negative and significant impact on economic growth in the long run, whereas in short run the effect of crime on economic growth is negative but insignificant. ECM term explains that adjustment process is quick. Our model is free from hetroskedasticity, autocorrelation with satisfactory functional form, which suggests the stability of our model. The CUSUM and CUSUMSQ are showing that the model is structurally stable and stays within the 5% of critical bounds. It is recommended that Pakistan needs stable and visionary government to control crime in order to enhance economic growth. Moreover, social evils like poverty and unemployment should be reduced by providing job opportunities to unemployed youth to minimize frustration of the society.

KEYWORDS: Crime, Economic Growth, Model Stability, ARDL, Pakistan.

1. INTRODUCTION

The importance of economic growth has no denial both in theoretical and empirical economic literature. Growth of the economy is a fundamental objective in any policy decision making. Economic growth of an economy for a sustained period of time is a prerequisite for poverty alleviation process. It makes possible the generation of employment opportunities as argued in Okun's law. Generated employment increases the sources of higher incomes. It is the economic growth that has enabled the modern world to achieve the development objectives of sustenance, self-esteem and servitude. Objective of poverty alleviation can be achieved by increasing growth of the economy. The establishment of the basis of sustained growth trajectory of the economy warrants a suitable environment for investment. Though a sufficient amount of investment in talent and effort for policy making plays a vital role in growth and development of the economy yet law and order situation and governance has its own importance. Bad law and order situation and crimes create unrest in the economy. Crime increases uncertainty in the society. Crime is an unacceptable phenomenon in any civilized society. The history of crime dates back to the origin of human history on this globe.

There is no universal and permanent definition of the crime. In different era different definitions were presented. Any act or an omission that is forbidden, for the protection of public, by public law and is liable to be punished in a legal proceeding in its own name is a crime (Marshal and Clark, 1952). In other words, crime is an instrumental act of violation of law that is committed without any justification and sanctioned as offence by the state (Tappan, 1960). Gillado and Tan-Cruz (2004) considers the violations of the penal code of the country to be a crime. These crimes include murder, physical injury, rape, theft, homicide and robbery. Gillado and Tan-Cruz (2004) term these crimes have their socioeconomic significance in the economy. In the present study, we have considered murder, attempted murder, dacoity, robbery, burglary and cattle theft as criminal activity.

Crime is the major source of discomfort and insecurity in the society. It is the wrong doings classified by the state or the parliament of the country. Pakistan is a country that is facing civil conflicts, high levels of criminality, narcotic activities, forced displacement and kidnappings. These all are the common lot of a developing country. Economists are working at their level best to give policies for Pakistan that helps in reducing poverty and crime from the country. The concept of criminality is quite wider and is not possible to define it in few lines. This concept is related with manslaughter, street crime, kidnapping, thieving, killing, drug trafficking, crime against property or

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mixture of all these actions. Crime is a serious problem that is the hindrance of economic development in the developing countries. There has been long belief that crime is harmful for economic development of the country.

The prevalence of crime in an area discourage business and in this way contributing to poverty. High crime area may also attract criminals because it would be best place for their illegal business activities. Crime is associated with money and acceptance the law breaking behavior. Crime discourages economic activities and hence is the hindrance in the development of the country. Organized crime is more damaging. Crime makes the daily life more dangerous and it challenges the viability of the government. Crime affects negatively the accumulation of physical, human and social capital. It increases production costs as because of crime expenditure on insurance premiums and private security increased. Crime also destroys the social infrastructure of the society. Fear generated by criminals affect productivity when employees are willing to work few hours or even not willing to work in a specific time periods or near in bad neighbors.

The crime rate, in Pakistan economy, has been increasing over time. Increase in murder, attempted murder, dacoity, robbery, burglary, cattle theft, sectarian casualties, terrorism activities and suicide blasts during the decades especially in the last decade. Higher criminal activities have created uncertainty in the economy. This might have dwindled the confidence of investors in the economy. Higher crime rate might have affected the growth of the economy. The present study is an attempt to assess the impact of crime on economic growth of Pakistan economy. Time series data from 1980 to 2011 has been used for the analysis. Autoregressive Distributed Lag (ARDL) approach has been applied to explore the impact of crime on economic growth.

2. LITERATURE REVIEW

Becker (1968) sheds light on the economics of crime and argues that if an individual indulges in criminal activity if expected utility of crime is greater than the utility of consuming his time in lawful activities. A criminal individual have some psychological and physical benefits from criminal activities. However, some costs in the shape of law-enforcement are involved. Probability of being caught and punishment after detention are two major costs to the criminals. The effect of crime on economic growth is unspecified (Ehrlich, 1973). Homicide rate and GDP growth rates are correlated (Rubio, 1995). Social capital formation is negatively affected by crimes (Glaeser *et al.*, 1996). Masih and Masih (1996) found that there was no effect of criminal activity on socioeconomic variables included in the study. Crime has its adverse impacts on governance in the economy (World Bank, 1997).

Violence not only creates instability, uncertainty and fear in the society but it has its adverse impact on physical capital. The acts of vandalism result in destruction of roads and public physical infrastructure (Ayres, 1998). Violence causes the school attendance to decline especially in the evening. This thereby reduces the efficiency of the students (Ayres, 1998; Buvinic *et al.*, 1999). Students especially the female students that witness the aggression and violence are more likely to drop out from the school (Morrison and Orlando, 1999). Londono and Guerrero (1999) estimated that urban violence decreased investment and its productivity in a group of six economies of Latin America. Crime and investment were negatively related in Colombia (Parra, 1998). Forni and Paba (2000) analyzed the impacts of several socioeconomic variable on economic performance in Italy. The authors found murders, as an index of crime, to have robust effects on employment growth.

Del Monte and Pagani (2001) used dynamic panel data techniques to conclude negative impacts of corruption on private investment and public expenditure. Peri (2004) concluded adverse impact of murders on annual employment and per capita growth in the provinces of Italy. Increased crime cause the workers to work less and workers do not want to work at dangerous times (IABD, 2003). Narayan and Smyth (2004) applied ARDL approach to find out that and stealing to Granger cause income in short run. Whereas robber and motor vehicle theft were found to Granger causes unemployment in the short run. Unemployment, motor vehicle theft and homicide Granger caused income in the long run. Capasso (2005) analyze crime, inequality and growth relationship beyond the commonly accepted idea about the impact of criminal activity on economic growth. The author explores the effect of crime on public investment and find out that public resource cannot be allocated to productive activities such as healthcare and education rather these resources are diverted to improve security and law and order situation in the economy.

Stone (2006) shed light on the links between crimes and economic growth by focusing on costs of criminal activities on business activities and the perceptions about crime in South Africa. The study confirms the argument that crime restraint growth of the economy through the channel of investment. The reduction in costs of crime to business is required. A strong a robust judicial system would be beneficial in lowering the costs to businesses. Furthermore, author suggests policy implications for the control of crimes in South Africa. There is negative relationship between ransom abduction and investment (Pshiswa and Suarez, 2006). Walker and Jackson (2007) found no Granger causality between casino revenues and real per capita income in U.S.A. the authors used, for the period of 1991 to 2005, annual data of 11 states for the analysis. Crime and violence affect the welfare of the citizen

in the Caribbean region through multiple channels. Crimes and violence wreak extensive costs by creating an atmosphere of fear amongst the citizens and hamper growth of the economy.

Moreover, crimes and violence, in short run, have their negative effects on human welfare and, in long run, adversely affect social development and economic growth (World Bank, 2007). Crimes, in Italy, have their impacts on foreign direct investment (Daniele and Marani, 2008). There is a great cost of criminal activities that are imposed on society and economy. Estimation of social damages of crime is very important. Crimes inflict adverse impact on the society (Czabanski, 2008). The recognition and evaluation of costs of crime, economic literature, has been paid attention. Criminal activities act like a tax on the overall economy. Domestic and foreign investments are discouraged by these activities. Higher crime rates may reduce the competitiveness of the firms, distort resource allocation, decrease efficiency and create uncertainty in the economy. There are two approaches to assess the crowding out effect of crimes on economic performance of the economy (Sandler and Enders, 2008).

Tang (2009) attempts to investigate the association among crime rate, inflation and unemployment in Malaysian economy for the sampled period from 1970 to 2006. Bartlett corrected trace test (Johansen, 2002) has been used for the analysis. The test results confirmed long run association between inflation, unemployment and crimes. The study could not find out causality running from crime to inflation and/or unemployment but reverse causality was concluded. Furthermore, the study suggests the macroeconomic policy makers to lower crime rates by reducing inflation and unemployment in Malaysia.

Detotto and Pulina (2009) examine crimes by using cointegration and ARDL approach on Italian economy data for the period of 1970-2004. The results of the empirical analysis show that, at national level, socio-demographic variables have no significant impacts on crimes. Economic and deterrence variables explain pattern and evolution of crimes. Moreover, lack of deterrence results in an increase in crimes such as robberies, extortions, thefts, abductions, and total crimes. Furthermore, the study finds out that per capita income better explains theft and fraud. The authors argue that the economic downturns (upturns) cannot only be considered as a cause but also a consequence of crime.

Detotto and Otranto (2010) suggest state space model to examine the impacts of crime on economic growth in Italy. The study corroborates that crime hamper economic growth by discouraging investment, reducing the competitiveness of business entities and reallocating the resources and creating uncertainty. The study also suggests that there is an economic cost of crime in the economy and economic cost of misdemeanor show a robust fixed constituent. Furthermore, the authors could not conclude time-varying but significant economic cost of crime but there is no threshold value.

Neanidis and Papadopoulou (2012) aim to examine the relationship between criminal activity and fertility then they investigate the channels through which these variables jointly impact growth. The link between the crime and decisions about fertility depend on likelihood of criminal detain. A theoretical model was developed and tested empirically for theoretical forecasts. There is a positive link between crime and fertility but this link is not causal rather it exists endogenously through the probability of arrest. The impacts of crime and fertility on growth are positive due to the likelihood of avoiding apprehensions of arrest.

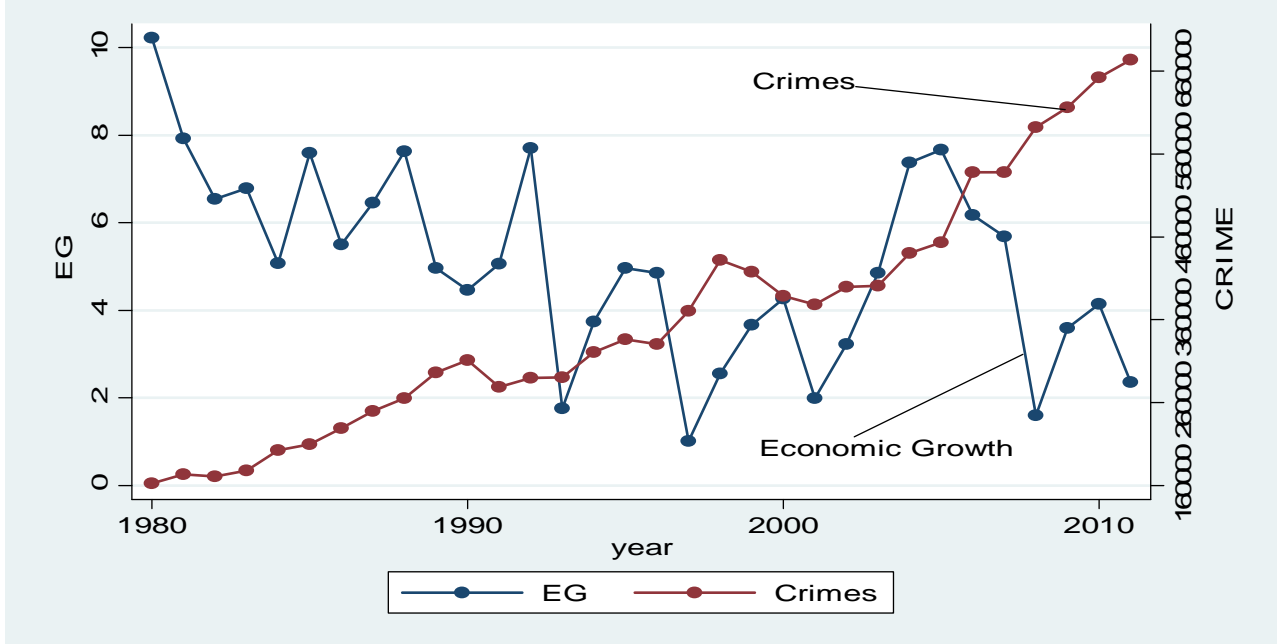
Goulas and Zervoyianni (2012) used panel data of 25 economies for the period of 1991-2007 to investigate crime-uncertainty linkages affect growth track. There is an asymmetric impact of increased crime on growth but this impact depends on extent of macroeconomic uncertainty in the economy. The results of the analysis in Goulas and Zervoyianni (2012) are evident that higher than average macroeconomic uncertainty increases the unfavorable impact of crime on economic growth. A 10 percent increase in crime rate causes a decline of 0.49-0.62 percent in per capita GDP growth in the sample economies.

Kumar (2013) uses state level data to analyze causal links between crime and growth. It is found, applying instrumental variable methodology, that higher levels of crime rate hamper per capita income and economic growth rates. International homicide and robbery rates negatively affect growth rates. Lowering of the homicide rate at national minimum level increases average annual growth rates. Moreover, it is observed that loss in growth is smaller in the states with higher per capita income. The results in Kumar (2013) are evident that quality of political, legal, economic institutions and socioeconomic policy environment may be helpful to crime levels and economic growth.

3. Data Collection and Descriptive Analysis

In this research paper we have focused on secondary type of data. All of the data is collected from the official economic survey of Pakistan, Pakistan statistics year books and WDI. In this study economic growth is treated as a dependent variable and crime is treated as independent variable for the period of 1980 to 2011.

Qualitative analysis is used to describe how economic growth and crime behave over time. Crimes in Pakistan economy are increasing and hindering the growth as well as development process.

Figure 4.1: Descriptive Data Analysis of Economic Growth VS Crime (1980-2011)

Source: Author

Figure 4.1, clearly indicates that crimes are enlarging with the passage of time, but economic growth is showing fluctuating trend. The above figure points out that there exist negative relationship between crimes and economic growth.

4. Econometric Model & Testing of Hypotheses

To find the long run and short run relationship between crime and economic growth, ARDL to co-integration method is used proposed by Pesaran and Shin (1999). This methodology is better than the others econometric techniques. ARDL method to cointegration can be used, when different series are integrated of different order, viz., I(0) and I(1). Moreover, endogeneity problem can be avoided by using ARDL technique.

A simple model is used to find the relationship between crime and economic growth. So our econometric model is given below:

$$EG_t = \beta_0 + \beta_1 CR_t + v_t ; \frac{d(EG)}{d(CR)} < 0 \text{ Or } \beta_1 < 0 \quad (1)$$

Where,

EG= Economic Growth.

CR= Crime.

v_t = Stochastic Error Term.

It is expected that increase in crime leads to less economic growth, ($\beta_1 < 0$).

The equation of ARDL is as follows:

$$\Delta(EG)_t = \beta_0 + \beta_1 (EG)_{t-1} + \beta_2 (Crime)_{t-1} + \sum_{i=1}^n \delta_i \Delta(EG)_{t-i} + \sum_{i=0}^n \delta_i \Delta(Crime)_{t-i} + u_{1t} \quad (2)$$

The null and alternative hypotheses are as follows:

$$H_0 : \beta_1 = \beta_2 = 0 \quad (\text{No long run relationship exist})$$

Against the alternative hypothesis:

$$H_1 : \beta_1 \neq \beta_2 \neq 0 \quad (\text{long run relationship exist})$$

The error correction equation is used to find the speed of adjustment towards equilibrium; ECM equation is as follows:

$$\Delta(EG)_t = \gamma_0 + \sum_{i=1}^n \gamma_i \Delta(EG)_{t-i} + \sum_{i=1}^n \theta_i \Delta(Crime)_{t-i} + \lambda(ECM)_{t-1} + u_{2t} \quad (3)$$

Where $\Delta(EG)_t = (EG)_t - (EG)_{t-1}$, $\Delta(Crime)_t = (Crime)_t - (Crime)_{t-1}$, u_{2t} = Error Term.

Finally, Cumulative sum (CUSUM) and cumulative sum of square (CUSUMSQ) tests are utilized to check the stability of the variables in short run and long run. If the plots of the CUSUM and CUSUMSQ are lying within the critical bounds of 5 % significance levels the null hypothesis cannot be rejected. It means that the variables used in the model are stable structurally.

5. EMPIRICAL RESULTS

Table 6.1: Augmented Dickey-Fuller (ADF) Test with Trend and with Intercept

Null Hypothesis: There is unit root; Alternative Hypothesis: There is no unit root

Variables	Level / 1 st Difference	ADF test statistic		Conclusion
		Trend	Drift	
EG	Level	-3.226	-2.899*	I(0)
Crime	Level	-1.030	1.168	----
$\Delta(\text{Crime})$	First Diff	-3.464**	-3.240*	I(1)
Source: Author's calculations using Stata software package 11.1				

Note: * denote significance at 5% and ** denote significance at 10%.

The Table 6.1 shows the order of integration of variables used in the model. We apply ADF test to check stationary of variables, under the assumption of constant and trend. Economic Growth is stationary at level, whereas crime is stationary at 1st difference. Since variables used are I (0) and I (1), so ARDL technique is preferred.

Table 6.2: F -Test for the Existence of a Long Run Relationship

F-statistic	95% Level of Confidence		90% Level of Confidence	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound
8.4565	5.4297	6.4295	4.2864	5.1471
Note: Critical value bounds are computed by stochastic simulations using 20000 replications.				

In table 6.2, the calculated value of F-statistic = 8.4565 is higher than the upper bound critical value at 5% level of significance (6.4295). So, there exists long run relationship between the variables.

Table 6.3: Diagnostic Tests

Item	Test Applied	CHSQ (χ^2)	Probability value
Serial correlation	Lagrange Multiplier Test	0.0949	[0.758]
Functional Form	Ramsey's reset test	0.0148	[0.903]
Normality	Test of skewness and Kurtosis	2.4256	[0.297]
Heteroscedasticity	White Test	0.2813	[0.596]
Source: Author			

Table 6.3 shows various diagnostic tests. The results of diagnostic test demonstrate that our model is free from serial correlation and heteroscedasticity. Functional form is up to mark and normality assumption is also satisfied.

Table 6.4: Autoregressive Distributed Lag Estimates

ARDL(1,0) selected based on Akaike Information Criterion				
Dependent variable is EG				
Variable	Coefficient	Std. Error	T-Statistic	Prob.
EG(-1)	0.3279	0.1625	2.0180	[0.053]
CRIMES	-0.4087E-5	0.2481E-5	-1.6474	[0.111]
C	4.6984	1.5109	3.1096	[0.004]
R-Squared	0.29692		R-Bar-Squared	0.24670
DW-statistic	2.0417		F-Stat. F(2,28)	5.9124 [0.007]
Akaike Info. Criterion	-62.7190		Schwarz Bayesian Criterion	-64.8700
S.E. of Regression	1.7478		S.D. of Dependent Variable	2.0138
Residual Sum of Squares	85.5370		Equation Log-likelihood	-59.7190
Source: Author				

In the above table 6.4, Economic growth is a dependent variable and independent variable is crime. Results indicate that crime has negative, but insignificant impact on economic growth. The value of R^2 (i.e. the coefficient of determination) in this model represents that 29.7% of the variations in the dependent variable (i.e. EG) is due to independent variables included in the model. The value of F statistic is also significant at 5% level of significance which shows overall goodness of fit. Stochastic error term (ϵ_t) is normally distributed (Appendix-A). The model is free from the problem of autocorrelations (DW value = 2.042).

Table 6.5: Estimated Long Run Coefficients using the ARDL Approach

ARDL(1,0) selected based on Akaike Information Criterion				
Dependent variable is EG				
Variable	Coefficient	Std. Error	T-Statistic	Prob.
CRIMES	-0.6081E-5	0.3336E-5	-1.8232	[0.079]
C	6.9910	1.3209	5.2926	[0.000]

Table 4.4 shows the results of long run coefficients under ARDL method. Results reveal that crime has negative and significant effect on economic growth in long run. This negative relation between crime and economic growth highlight that criminal activities slow down development projects as well as economic growth of Pakistan. People are afraid to work at Karachi due to criminal activities.

Table 6.6: Error Correction Representation for the Selected ARDL Model

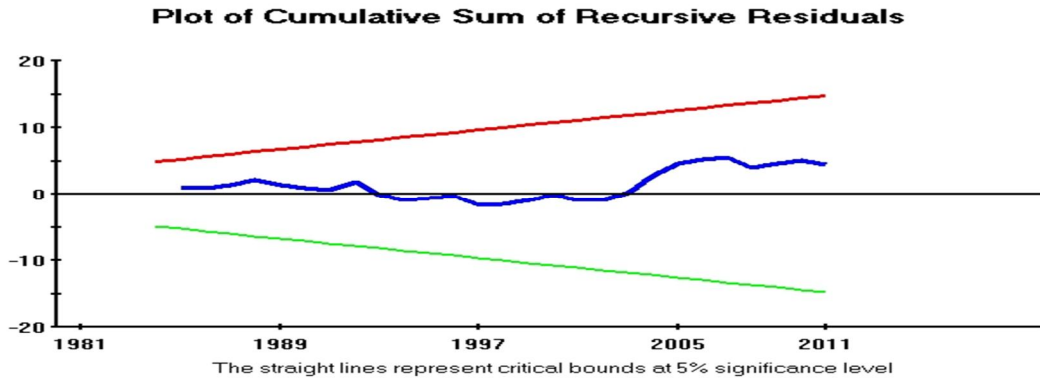
ARDL(1,0) selected based on Akaike Information Criterion				
Dependent variable is Δ (EG)				
Variable	Coefficient	Std. Error	T-Statistic	Prob.
Δ (CRIMES)	-0.4087E-5	0.2481E-5	-1.6474	[0.111]
Δ (C)	4.6984	1.5109	3.1096	[0.004]
ECM(-1)	-0.67207	0.16250	-4.1358	[0.000]
R-Squared	0.37950		R-Bar-Squared	0.33518
DW-statistic	2.0417		F-stat. F(2, 28)	8.5625 [0.001]
Akaike Info. Criterion	-62.7190		Schwarz Bayesian Criterion	-64.8700

Source: Author

$$ECM = EG + .6081E-5*CRIME -6.9910*C$$

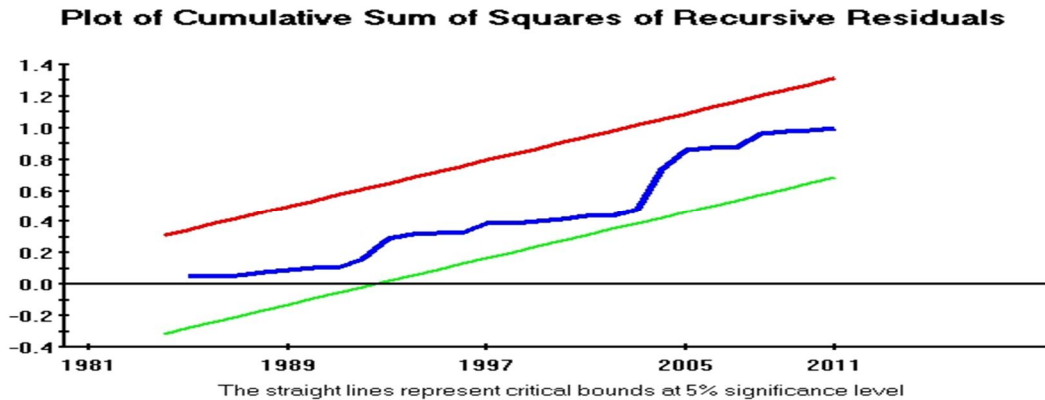
Table 6.6 indicates crime has negative, but insignificant impact on economic growth in short run. The ECM (-1) is the lag value of one period of error term, that we find out from the long run relationship. The value of ECM shows that the disequilibrium of short run will be fixed in long run. The ECM (-1) should have a negative and statistically significant value. The value of ECM term shows that the process of adjustment is quick and 67% of the last year disequilibrium in economic growth from its equilibrium path will be corrected in present (current) year.

Figure 6.1: Plot of Cumulative Sum of Recursive Residuals.



Source: Author

Figure 6.2: Plot of Cumulative Sum of Squares of Recursive Residuals.



Source: Author

Stability of estimated coefficients is checked with the help of CUSUM and CUSUMQ test advocated by Brown, et al. (1975). Figure 6.1 and figure 6.2, show that both CUSUM and CUSUMQ are lying within the critical bounds so our model is structurally stable.

6. Conclusion and Policy Implication

This study examines the impact of crime on the economic growth of Pakistan by using yearly data from 1980 to 2011. Autoregressive Distributive lag (ARDL) to cointegration is used to find short and long run relationship between crime and Economic growth. In short run crime has negative, but insignificant effect on economic growth. Results of long run reveal that crime has negative and significant effect on economic growth. This negative relationship between crime and economic growth highlight that criminal activities slow down development projects as well as growth of Pakistan economy.

Our model is free from hetroskedasticity, autocorrelation and error term is normally distributed, which suggest the stability of our model. The co-efficient ECM (-1) is negative and statistically significant. Furthermore, process of adjustment is quick and 67% of the last year disequilibrium in economic growth from its equilibrium path will be corrected in present (current) year.

It is recommended that Pakistan needs stable and visionary government to control crime in order to enhance economic growth. A strong and pragmatic policy to address the issues regarding crime would help the country to overcome the problem. There is a dire need to establish writ of the government. The proper legislation and implementation of the existing laws would help to reduce the crime rate.

The culprits must be brought to justice. The assurance of rule of law and impartial functioning of the judiciary should be assured. There is a need of reforms in the judicial system especially at lower level. Improvement in the capability and efficiency of law enforcement agencies coupled with the proper training of police official would be beneficial. Moreover, social evils like poverty and unemployment should be reduced by providing job opportunities to unemployed youth to minimize frustration from society. Poverty and inequality in the economy fuels the sense of deprivation amongst the masses. Higher poverty levels and skewed distribution of resources may be the major source of criminal activities. The conflict between the 'haves and have-nots' may create unrest amongst the masses. Lack of education is one of the major causes of immoral character of the individual. Increase in the education significantly decreases the criminal propensity (Lochner, 2004). The control on sectarianism and religious extremist through proper education would bear its fruits in shapes of peach and hormone in the society.

On the economic side, a robust economic policy to increase investment in the economy is a must. The development of infrastructure to induce investment in the economy would play fundamental role in attracting not only the domestic investment but also foreign investment. Pakistan economy has been facing energy crises for two decades. Electricity shortage has adversely affected the economy. The existing industrial units have been shutting down due to the deficiency of electricity and gas. Increase in reliance on thermal power sources has increased the demand for oil significantly. Increased import bill has aggravated the problem of financial constraints for the economy. Increased in import bill increased the demand for foreign exchange resulting in an increase exchange rate. Exchange rate negatively and significantly affects economic growth in Pakistan (Ahmad *et al.*, 2013).

Furthermore, the war on terrorism has diverted the resources of the economy from socioeconomic development projects of the economy. Revival of the industrial sector of the economy would help to generate employment opportunities in the economy. Small and medium enterprises generally located in the rural and suburban areas can be helpful in generating economic activity. Establishment of small and medium enterprises (SMEs) need less financial resources than that are required for large scale manufacturing. Small scale industries are relatively labor-intensive (Ali, 2013). So development of SMEs can make a difference by increasing the employment opportunities and increasing the economic activities in the economy. Increased employment would help in alleviating poverty and reducing income inequality in Pakistan economy. This would help in decreasing the criminal activities and reduce uncertainty resulting in investment and stimulating economic growth in Pakistan.

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The authors declare that they have no conflicts of interest in this research.

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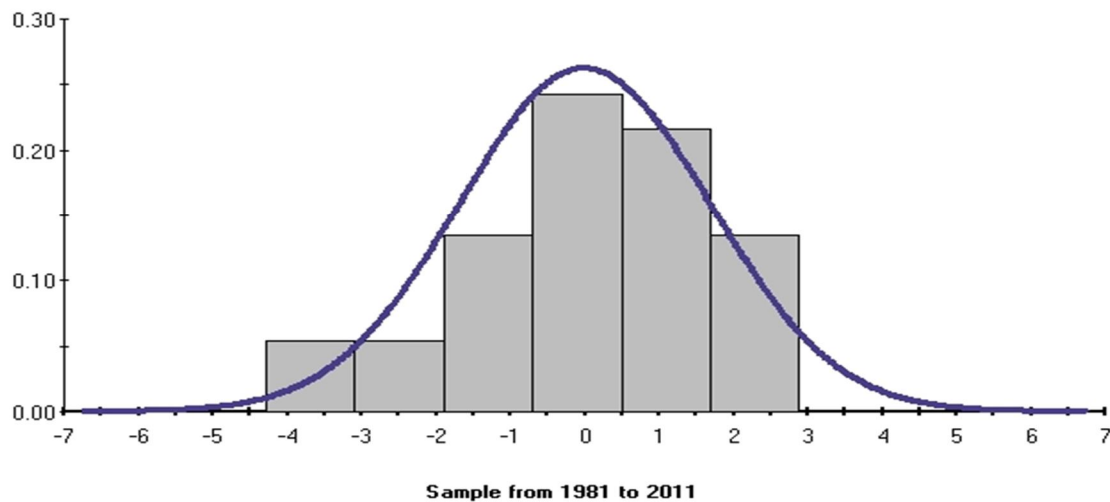
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APPENDIX-A

❖ **Figure: The Error Term (ϵ_t) of the model is normally distributed.**

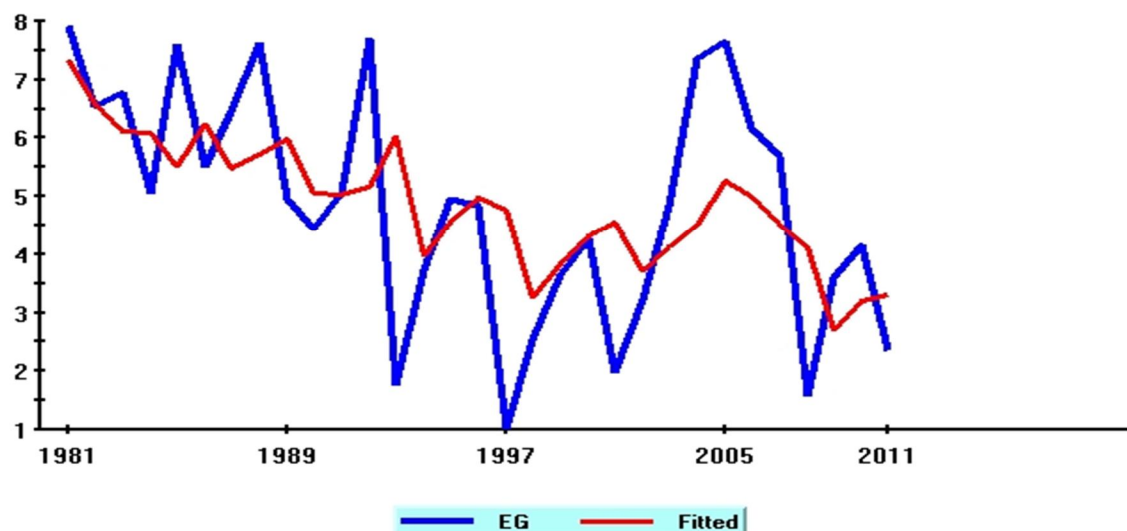
Histogram of Residuals and the Normal Density



Source: Author

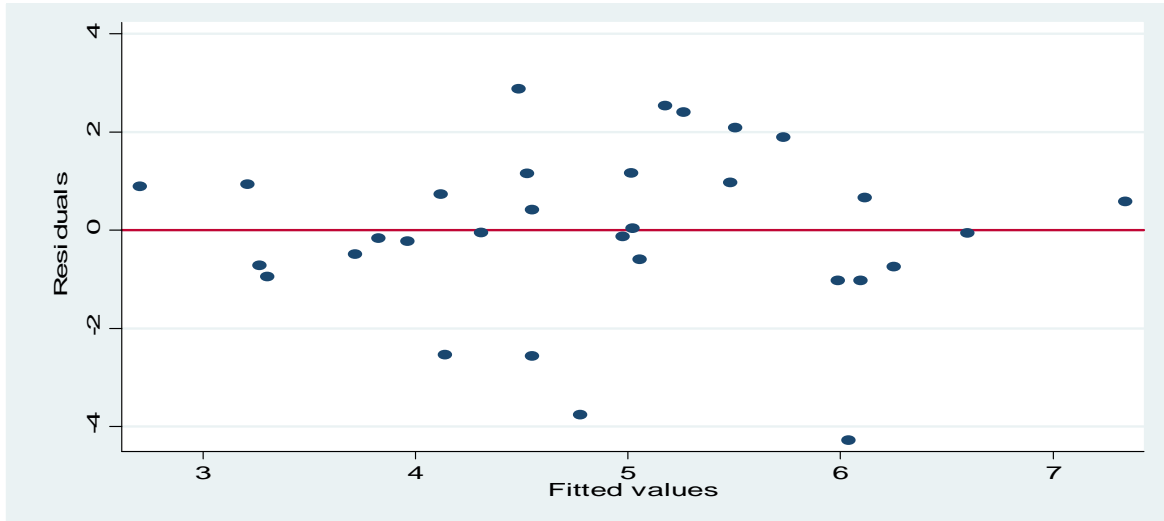
❖ **Figure: Actual VS Fitted Plot.**

Plot of Actual and Fitted Values of EG



Source: Author

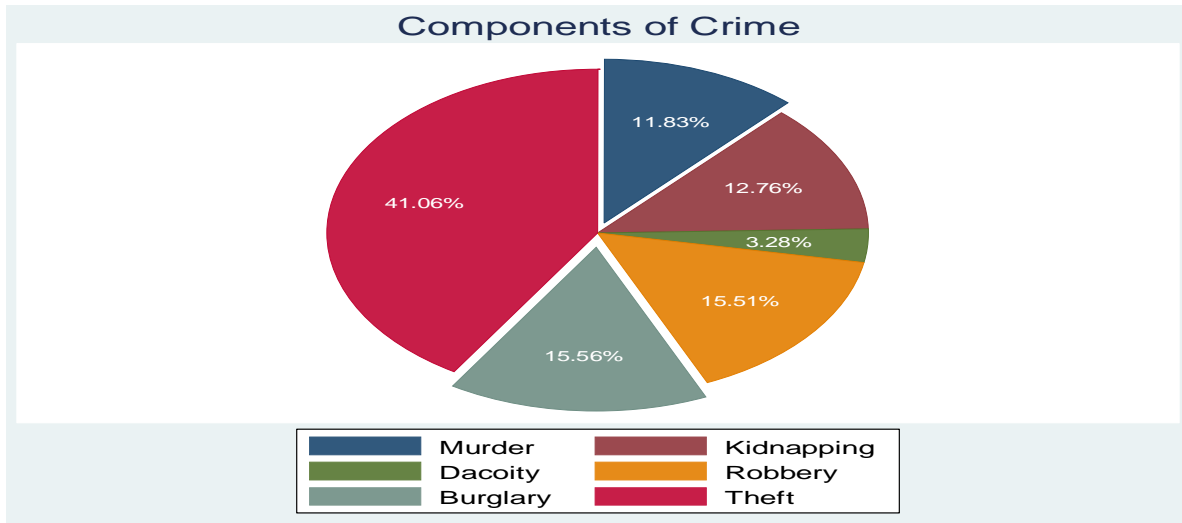
❖ **RVEPLOT (Residual VS Fitted Plot)**



Source: Author

APPENDIX-C

❖ **Pie Chart of Selective Reported Crimes**



Source: Pakistan Statistical Yearbook

APPENDIX-D

Selective Crimes Reported in Pakistan

Year	Murder	Attempted Murder	Dacoity	Robbery	Burglary	Cattle Theft	All Reported
2000	8906	11224	1297	7513	14433	6618	388909
2001	9528	11433	1372	7672	13057	5542	378301
2002	9396	10945	1631	8235	13318	5420	399568
2003	9346	11562	1821	8434	13049	6742	400680
2004	9719	12678	2338	11851	13647	7924	440578
2005	9631	12863	2395	12199	12067	11884	453264
2006	10048	13729	2895	14630	12872	13327	537866
2007	10556	13840	3260	16639	12067	9388	538048
2008	12059	15083	4529	19943	14943	8880	592503
2009	12491	14962	4457	19138	15073	9456	616227
2010	13208	15478	4727	21907	16638	8373	652383
2011	13860	15496	4980	20632	18195	9345	673750

Source: Pakistan Statistical Yearbook