



Contents lists available at ScienceDirect

ScienceDirect

journal homepage: www.elsevier.com/locate/aebj

The Socio-Economic Determinants of Crime in Pakistan: New Evidence on an Old Debate



Nabeela Khan^a, Junaid Ahmed^b, Muhammad Nawaz^c, Khalid Zaman^{d*}

^a Department of Management Sciences, COMSATS Institute of Information Technology, Abbottabad, 20060, Pakistan.

^b Department of Development Economics, University of Göttingen, Germany

^c Junior Researcher, Pakistan Institute of Development Economics, Islamabad, Pakistan

^d Department of Economics, University of Sargodha, Canal Campus, Lahore, Pakistan

ARTICLE INFO

Article history:

Received 24 September 14

Received in revised form 14 January 15

Accepted 17 April 15

Keywords:

Crime rates

Higher education

GDP per capita

Pakistan

ABSTRACT

Crime appears to be strictly related to the level of education attained and to individuals' economic and social background. The objective of the study examines multiple factors i.e., education, unemployment, poverty and economic growth which contributed to the rate of crimes in Pakistan during the period of 1972–2011. The study finds a positive relationship between crime rates and unemployment rate in Pakistan. Higher unemployment diminishes the rate of return of legal activities, and is more likely to increase the return of illegal activities. There is a significant negative relationship between the crime rates and the higher education. More education directly induces high earnings of individuals and may increase both the opportunity cost of crimes and the cost of time spent in criminal activity. The study further assesses that GDP per capita leads to higher crime rates in the long-run but to lower rates in the short-run. Higher income shows that there are greater benefits for criminals as for thefts and robberies. Affluent areas attract more criminals due to the opportunities available to them. Finally, there is a positive relationship between the crime rates and poverty in the long-run but there is a negative relationship in the short-run. Poverty may lead to a high level of stress and mental illness which in turn causes individuals to adopt the criminal behavior. The study posits a caution that policy formulation in ameliorating crimes in Pakistan should anchor both social and economic factors.

© 2015 Holy Spirit University of Kaslik. Hosting by Elsevier B.V. All rights reserved.

1. Introduction

The swift increase in criminal activities in various parts of the world has generated the economics of crimes. Criminality originates from the Latin word “Crimen” which is presented as a social issue that cannot be ruled out from the individual's life. The jealousy of Cain appeared in the murder of Abel (the sons of Adam and Eve) that resulted in the first crime in the history of mankind (Gillani, Mahmood, Rehman & Rashid, 2008). Crimes always create distortions and discomfort in every society which results in the feelings of insecurity among people of a specific society. Simply crime is the wrongdoing, as it is an attempt to get something for nothing, or the commission of an act forbidden by law.

The economics of crimes started with Becker's (1968) work that interacts with different fields like criminology, sociology, geography and demography (Buonanno, 2003). In 1930's, criminologists presented the theory stating that unemployment could be a major cause of crime. Merton (1938) offered a social theory that people commit crimes when society sets goals for its members, as making money to purchase material goods, but also creates

* Khalid Zaman Tel.: +92-334-8982744; fax: +92-042-3834417.

E-mail address: khalid_zaman786@yahoo.com

Peer review under responsibility of Holy Spirit University of Kaslik.

barriers to those achievements. A person is less likely to commit a crime when there are substantial rewards and when he enjoys respect in the society they belong to. Crime is a negative externality which imposes the huge economic and social cost on both government and people of the country. Some criminologists and economists indicate that inequitable distribution of resources compels the individuals to adopt the criminal behaviour (Brush, 2007).

Many approaches were used to determine the economics of crimes, which may differ from a country to another. According to Alexandros & Nikolaos (2010), there is a persistent rise in the criminal activities in the developed nations as well as in the western world through the last decades. As far as the cost and benefits are concerned, economists consider the behaviour of criminals as the rational choice. They choose the best alternatives by doing the cost and benefit analysis of the legal and illegal choices open for them. The major focus of economists is on the economic factors that determine the crimes in a society (Kustepili & Onel, 2006). The appropriate actions for the reduction and prevention of crimes rates have become a major issue for every country.

The above discussion confirms that the economic deprivation is the most important causal determinants of crimes in most of the countries. Therefore, it is logical that the economic hardship causes crimes rates to increase. It is also the fact that there is a relationship between the crime rates and the state of economy. An economic approach to understanding the criminal behaviour is an effective tool for dealing with the problem of crimes. The present study tests this relationship in the context of Pakistan over the period of 1972-2011. As in Pakistan, crime rate has increased manifold owing to different economic and social factors.

1.1. Crime Scenario in Pakistan

It is true that no part of the world is without crime. Both developed and developing countries have been victim of that inequity since the birth of human being. However, this issue has become severe in least developing countries (LDCs) predominantly in Pakistan, where a huge increase occurred in the reported crimes according to the crime statistics. The mass size of crimes has been meticulous due to the high unemployment, the soaring prices of food and raw materials, the increasing gap between the rich and the poor, the migration from scattered areas toward populated areas and the lack of education. Crime is not related to some specific group or community of people, but many well off and educated people are also seen to involve in the criminal behaviour or activities. Table 1 shows an overview of population and crime rates in Pakistan.

Table 1- Population and Crime Rates in Pakistan.

Year	Population in Millions	No. of Crimes Reported	Crimes growth rate
1951	33.82	76519	-
1958	38.12	81124	6.02
1961	42.97	79900	-1.51
1966	51.98	93633	17.91
1971	62.88	129679	38.50
1976	72.12	167032	28.80
1981	83.84	152782	-8.53
1986	97.67	220035	44.02
1991	112.61	403078	83.19
1998	133.61	431854	7.14
2000	139.76	388909	-9.94
2003	149.03	400680	3.03
2005	153.69	453264	13.12
2007	158.17	538038	18.71
2008	162.37	538048	2.30
2009	169.94	559480	9.97
2010	173.51	583791	10.11
2011	177.58	610242	4.530

Source: GoP (2012).

The provincial crime rates are reported in Table 2 for ready reference.

Table 2- Crime Rates within Provinces (Total recorded crimes).

Province/ year	2006	2007	2008	2009
Punjab	342,149	344,561	374,076	383,383
Sindh	55,598	60,414	77,296	90,202
KPK	224,649	224,649	228,087	228,087
Baluchistan	7,696	8,343	9,830	10,215
Islamabad	4,248	4,397	5,644	5,552

Source: Abbasi (2010).

According to statistics, the total of crimes reported in 1947 was 73,107 and it increased to 129,679 in 1971. Then, it became double from 152,782 to 403,078 during the 1980-1990 period. In 2007, the total number of crimes went to 538,048. These figures show only the reported crimes; however, there are almost 30-50 % crimes that are unreported in Pakistan (Gillani, Mahmood, Rehman & Rashid, 2008). The increasing trend in the crime rates over the country makes the people think about their security and safety. The overall crime rate in the country is today higher as compared to two years ago. Official statistics show that the overall crime rate, both at the Centre and in all the provinces, have increased despite all claims and policies made by the present federal or provincial rulers. It is a failure on part of the law enforcement agencies that the crime rate has shot up in the past couple of years (Abbasi, 2010).

Crimes are of different types such as murders, robbery, burglary, larceny theft, motor Vehicle theft that includes arson, and victimless crimes. There are some other crimes, such as bank frauds, credit card frauds, tax evasions, insurance fraud, computer crimes, cellular phone crime etc. These types of crimes are called white-collar crimes committed by a person belonging to a high social status in the course of his occupation. Criminologists and

sociologists employed the term “Dark figure of crime” which describes the amount of unreported and undiscovered crimes. So there is a gap between the official level of crimes and the actual amount of crimes in community.

Criminology has the long history but research on the relationship between crimes and economics remains limited because of some systematic doubt among many economists on the response of crimes rate to economy (Ishikawa, 2009). But the persistent increase in the illegal activities throughout the human history has compelled the economists to think over about it that is under their huge consideration (Kustepili & Onel, 2006). Increasing trend of crimes rate in Pakistan have been the blistering issue among researchers, policy makers and social thinkers. Based on the analysis given, the foremost objective of the study is to uncover the factors which make people adopt the criminal behaviour with respect to economic and social side in both the short and long-runs. In addition to that, the study is also helpful for national government’s officials in implementing anticrime policies.

The rest of the research is organized as follows: Section 2 shows the related literature review. Data and Methodological framework is explained in Section 3. Results are estimated in Section 4. Final section concludes the study.

2. Literature Review

There is a vast amount of theoretical and empirical literature explaining the determinants of crimes in developed and developing countries. Various studies have been carried out in order to find the determinants of crime rates. Becker (1968) is the pioneer in the field of criminology study which indicates that some individuals adopt criminal behaviour after comparing financial rewards from crimes to the legal work. Ehrlich (1973) extends the Becker’s study by incorporating the income levels and distribution effects and concludes that unemployment is a determinant of crime rates. Coman, Joyce & Lovitch. (1987) develop the implication of vector autoregressive (VAR) model in order to examine the relationship among unemployment, arrests, police, demographics and property related crimes from 1970-1984. The empirical findings show that arrests provide a strong deterrent to crimes. However, unemployment and crimes have a weak correlation but demographic variables have a relatively stronger effect on crime rates in New York City. Elliot & Ellingworth (1992) use the British Crime Survey (BCS) sampled 11,713 households in England and 572 in Wales for the existence of relation between unemployment and crimes. The conclusion based on rank correlation coefficients and weighted least square (WLS) regression analysis indicates that there is a significant and positive relationship between the male unemployment and the crime rates while positive but insignificant relationship between the crime rates and male unemployment. Entorf & Spengler (1998) indicate that crime rates in East Germany are higher than West Germany mainly due to the differences of legal and illegal income opportunities. However, demographic variables also have important and significant effect on crime rate.

Hartung & Pessoa (2000) use the data of 643 cities of Sao Paulo state and show that fertility rate, numbers of children born from teenager mothers and fraction of children raised without mother or father are important determinants of property and violation of crimes. Cerro & Meloni (2000) empirically scrutinize for Argentina over the period ranging from 1990-1999 and conclude that unemployment and income inequalities have a significant positive relation with crime rate. Fischer (2001) examines pooled cross section data from 1986-1998 by incorporating the political institutions and find that direct democracy has no significant effect on most of the crimes in the Swiss Cantons. Fajnzylber, Laderman & Loayza (2002) empirically examine the causality between crimes and income inequalities across the 39 countries over the period 1965-1995. The study finds the correlation between the Gini index, robbery rate and homicides within the countries. The conclusion indicates that there is positive relationship between the crime rates and income inequality between the countries and within the countries. Loncher & Moretti (2003) employ the US census data and use the public versions of 1960, 1970 and 1980 census reports and conclude that schooling significantly reduces the crime rates and education make people risk averse. Lancher (2007) also finds a negative correlation between the educational attainment and crime rates.

Buonanno (2003) examines the effect of education on crimes in twenty Italian regions over the time period from 1980-1995 and finds that there exists a negative relationship between education and crime rate. Gumus (2004) empirically inspect the relationship between crime rates and urbanization by using cross-sectional data of US large cities. The findings based on simple correlation and regression analysis indicate that per capita income, income inequality, population and black population are the important determinants of crimes in urban areas, while unemployment and expenditure on police force may weakly affect to crimes rate. Saridakis (2004) finds that there is no long-run relationship between the demographic, socio-economic and crime but imprisonment growth, income inequality, alcohol consumption and racial composition are the short-run determinants of crimes. Machin & Meghir (2004) explore the relationship between economic incentives and crime rates for England and Wales over the time period ranging from 1975-1996. The results find that crime rate is high in low wage rate areas or due to poor labour market opportunities.

Herzog (2005) concludes that economic hardship may lead the people to adopt criminal behaviour in order to meet the basic needs. Edmark (2005) confirms that unemployment has a significant positive effect on the property crime rates and it is not significantly related to the violation of crimes in the region. Kustepili & Onel (2006) securitize the issue for Turkey over the period 1967-2004 by defining the sub-categories of crimes and apply the Granger causality test through the vector error correction model (VECM) in order to find the causal relationship between variables. Brush (2007) finds that Gini coefficient and crime rate have unambiguous relation in both level and first difference form. Lin (2007) present the relation between the democracy and crimes from 1971-1996 and suggest that that democracy has a zero or negative relationship with serious crimes but has positive relationship with petty crimes.

Buonanno & Montolio (2008) examine the demographic and socio-economic determinants of crime rates by using panel data set of Spanish provinces. They conclude that clearance rate, urbanization and fraction of foreigners have significantly positive relationship with crime rates. Dutta & Hussain (2009) highlights that expenditure on police force, arrest rate; conviction rate and disposal of cases have different effects from those observed in case of developed countries. Baharom & Habibullah (2009) find that there is no long-run relationship between the income inequality and different categories of crimes. Iqbal & Jalil (2010) developed the relationship between urbanization and crime rates for Pakistan over the period 1964-2008. The

empirical findings indicate that there is a significant positive relationship between the urbanization and crime rates. Alexandros & Nikolaos (2010) suggest that economic depression causes to increase crimes whereas economic prosperity decreases criminal activities.

The above discussion confirms the strong relationship between socio-economic determinants and crime rates. There is a pressing need to evaluate multiple factors which may contribute to increase crime rates in the context of Pakistan.

3. Data and Methodological Framework

The study implies annual observations for the period of 1972-2011. The data set of unemployment rate and GDP per capita is obtained from *World Development Indicators* published by the World Bank (2012). The series of crime rates which capture murders, kidnapping, dacoits, robberies, burglaries, theft, and attempted murders and the data set of higher education enrollment rates which is the outline of professional college enrollments, arts & science college enrollments and university enrollments are both taken from various issues of GoP reports. Base-line for poverty which is measured by head count ratio is derived from GoP (2012), where 2,350 Calories are mentioned as cut-off point. The latest estimate of inflation-adjusted poverty line is Rs.944.47 per adult equivalent per month, up from Rs.878.64 in 2004-05. Same parameter estimates are used for ready reference in this study.

3.1. Theoretical Background

Based on the related review of literature, our model for empirical analysis can be defined as:

$$CR = f(UN, POV, GDPPC, HE) \quad (1)$$

Where,

CR represents crime rates in numbers;

UN represents unemployment rate i.e., the ratio of unemployed people out of labour force'

POV represents head count ratio in percentage;

GDPPC represents GDP per capita in US \$ and

HE represents higher education enrolment rates in numbers.

Most of the empirical studies conclude that all these factors mentioned in equation (1) are the important determinants of criminal behaviour in many countries. They may cause them to earn their income from other legal and illegal sources including the criminal activities. Employment is considered as the complimentary factor of the income opportunities from the legal labour market. High unemployment rate in any country may decrease the earning opportunities and may force the individuals to adopt the criminal behaviour. Poverty is another socio-economic variable in our study. If poor people have a limited income to fulfill their needs, they are most likely to be involved in other illegal activities to earn the desired income. So, poverty is the major economic determinant of crimes in the country (Gillani *et al.* 2009); Iqbal & Jalil, 2010). Education is the most important determinant of crimes rate that can reduce the crimes rate because high education confirms the job opportunities in the legal sector of economy. Both past and present education has negative effects on crime rates in a country (Buonanno, 2003). GDP per capita is also one of the major economic determinants of crime rates in any economy. Per capita income has non-linear impact on crimes as it has positive relation for lower middle income countries and negative for rich nations. For any type of crimes, there is an inverse U-shape relation (Andrienko, 2003). Table 3 shows the statistical summary of the underline variables for ready reference.

Table 3- Summary Statistics.

	Crimes rate	Unemployment	GDP per capita	Poverty	Education
Mean	2.438	4.697	453.158	27.159	793480.1
Median	2.565	4.320	471.000	25.000	684905.5
Maximum	3.431	8.270	657.000	43.008	2306758.0
Minimum	0.249	1.650	271.000	17.320	239239.0
Std. Dev.	0.750	1.956	118.199	6.393	530857.0
Skewness	-1.417	0.292	-0.002	0.854	1.233
Kurtosis	5.063	2.035	1.885	2.916	3.845

Source: Self calculation.

3.2. Econometric Methodology

Comparable to all other techniques, that utilize time series data, it is essential to distinguish that unless the diagnostic tools used account for the dynamics of the link within a sequential 'causal' framework, the intricacy of the interrelationships involved may not be fully confined. For this rationale, there is a condition for utilizing the advances in time-series version.

Dickey & Fuller (1979) have developed a famous test, known as the augmented Dickey-Fuller (ADF) test. This test is conducted by "augmenting" the equations by adding the lagged values of the dependent variable. The ADF tests the null hypothesis that a time series is $I(1)$ against the alternative hypothesis that is $I(0)$. The ADF test here consists of estimating the following regression:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t$$

Augmented Dickey Fuller has the following hypothesis:

H₀: $\gamma = 0$: variable is non-stationary at level, however, variable is stationary at their first difference,

H₁: $\gamma \neq 0$: variable is stationary at level.

If the null hypothesis is rejected it means that the variable is stationary. Whereas, acceptance of the null hypothesis means the series is non-stationary at level and need to be differenced to make it stationary. Phillips & Perron (1988) use the nonparametric statistical methods to take care of the serial correlation in the error term without adding lagged difference terms.

3.2.1. Cointegration

Cointegration is a statistical property of time series variables if they share common characteristics of stationary. Johansen cointegration developed by Johansen and Juselius (1990), which is used for the existence of long-run relationship among the variables under the assumption that they are stationary at the same order of integration. This approach also estimates the coefficients of variables along with the existence of long-run relationship among the underline series.

The existence of long-run relationship among the variables requires the short run estimates of variables that are obtained by applying the Vector Error Correction Model (VECM). The VECM is restricted VAR, where restriction is on the existence of a long-run relation of the series and all endogenous variables that are used in the differenced form. Dependent variable is regressed on its own lag as well as on the lags of other explanatory variables, the random error and the over year lag of error correction term.

$$\begin{aligned} \Delta CR_t = & \alpha + \sum_{i=1}^n \beta_0 \Delta (CR)_{t-i} + \sum_{i=1}^p \beta_1 \Delta (UN)_{t-i} + \sum_{i=1}^q \beta_2 \Delta (POV)_{t-i} + \sum_{i=1}^r \beta_3 \Delta (GDPPC)_{t-i} \\ & + \sum_{i=1}^s \beta_4 \Delta (HE)_{t-i} + \lambda_1 EC_{t-1} + u_t. \end{aligned} \quad (2)$$

Where, u_t , EC_{t-1} and λ_1 stand for random error term, error correction term or cointegrating factor and adjustment coefficient, respectively which shows that disequilibrium is adjusted in the previous period and at the level of the long run relationship its statistical significance is important. However, the significance of term in statistical inference is important for the correction of error in short to long-run equilibrium in response to the random shock. Due to the stationarity of the underlined variables, the application of least-square (LS) analysis is important for the estimation of Vector Error Correction Model (VECM).

4. Results and Discussions

The preliminary step in this analysis is to establish the degree of integration of each variable. To get reliable results for equation (2), the implicit assumption is that the variables in equation (2) and (1) are co-integrated. We test the existence of a unit root in the level and the first difference of each variable in our sample using the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) test. Both ADF and PP test statistics check the stationarity of series. The results in Table 4 reveal that all other variables are non-stationary in their level data. However, stationary is found in the first differencing level of the variables.

Table 4- ADF- test statistics.

Variables	Lags	Level	1 st Difference
CR	1	0.401	-5.13853*
HE	1	7.617	-5.24521*
UN	1	0.250	-3.22556*
POV	1	-1.228	-2.50864**
GDPPC	2	2.991	-3.24383**
Philips – Perron (PP) test statistics			
CR	1	0.613	-6.72326*
HE	1	8.123	-3.68027*
UN	1	0.282	-5.53547*
POV	1	-1.959	-3.16464**
GDPPC	1	5.553	-4.22242*

Note: Mackinnon (1996) one-sided p-values. * Significant at 1% and ** significant at 5% level respectively. Bracket shows lag length for ADF test and Bandwidth for PP test.

After evaluating the stationarity of the data for the underlining variables, we need to analyze the existence of cointegration as the long run relationship among the variables. For this purpose, we conduct Johansen Cointegration in order to analyze the long run relationship among the variables. Table 5 shows the long-run relationship among the variables.

Table 5- Results of Johansen test for cointegration.

Table 3- Results of Johansen test for cointegration.			
Rank max r Test	Max-Eigenvalue statistics		Critical value
$r_0 = 0$	$r_1 > 0$	117.04156*	34.80587
$r_0 \leq 1$	$r_1 > 1$	30.47187*	28.58808
$r_0 \leq 2$	$r_1 > 2$	24.15206*	22.29962
$r_0 \leq 3$	$r_1 > 3$	13.48274	15.89210
$r_0 \leq 4$	$r_1 > 4$	5.09976	9.16455

Rank trace r Test	Trace statistics		Critical value
$r_0 = 0$	$r_1 = 1$	190.24799*	76.97277
$r_0 = 1$	$r_1 = 2$	73.20642*	54.07904
$r_0 = 2$	$r_1 = 3$	42.73456*	35.19275
$r_0 = 3$	$r_1 = 4$	18.58250	20.26184
$r_0 = 4$	$r_1 = 5$	5.09976	9.16455

Note: *indicate the rejection of null hypothesis at 5% level of significance.

Table 5 shows that there is a long-run relationship among these variables as indicated by the three cointegrating equations. This study starts with the null hypothesis of no co-integration ($r=0$) among the variables. It is found that the trace statistic of 190.247 exceeds the 95 per cent critical value (76.97) of the λ trace statistic. It is possible to reject the null hypothesis ($r=0$) of no co-integration vector in favour of the general alternative $r \geq 1$. As evident in Table 5, the null hypotheses of $r \leq 1, r \leq 2$ are also rejected at 5 per cent level of significance. The null hypotheses of $r \leq 3, r \leq 4$ cannot be rejected at 5 per cent level of confidence. Consequently, we conclude that there are 3 co-integration relationships involving the variables CR, HE, UN, POV and GDPPC.

In contrast, λ max statistic rejects the null hypothesis of no co-integration vector ($r=0$) against the alternative ($r=1$) as the calculated value λ max (0, 1) = 117.04 exceeds the 95 per cent critical value (34.80). Thus, on the basis of λ max statistic, there are 3 co-integration vectors. The presence of the co-integration vectors shows that there is a long-run relationship among the variables. In order to check the stability of the long-run relationship between the CR and the independent variables, we assess the long-run estimates based on Johansen cointegration test, which is reported in Table 6.

Table 6- Long-run Estimates Based on Johansen Cointegration.

Dependant variable: Crime Rate		
Regressors	Coefficients	t-Values
GDPPC(-1)	0.01435*	7.59817
HE(-1)	-0.09416*	-7.15949
POV(-1)	0.07547*	9.67832
UNEM(-1)	0.36257*	8.74112

Note: * shows significance at 1% level of significance.

Empirical results indicate that there is a long run relationship among the crimes rates and explanatory variables. Coefficients of all the variables have generally expected signs and also statistically significant. The results show that if there is one percent increase in GDPPC, crime rates increase up to 0.014 percent in Pakistan. More income means that there are greater benefits for criminals as for thefts and robberies. It also means that richer areas attract more criminals due to the existence of such attractive opportunities available to them. In addition to that, increases in income provide more opportunities for the criminal offences due to the huge amount of stolen goods, which is known as the opportunity effect (Levitt, 1999). Besides, the per capita income affects the crime positively and is known as the routine activity effect. Beki, Zeelenberg & Van Montfort (1999), indicate that the more income people spend, the less time at home and increases the outdoor activities which increase the likelihood to be involved in criminal activities.

Increase in higher education may reduce crime rate by 0.094 percent. As more education directly induces high earnings of individuals and may increase both the opportunity cost of crimes and the cost of time spent in criminal activity (Iqbal & Jalil, 2010). In addition to that, education makes the people more rational and more risk averse. So it reduces the propensity to commit crimes. The cost for person committing crimes is very high because he can earn more money by spending time in legal works. Many studies proves that people involved in criminal behaviour tends to be less educated and have poor economic background as compared to the non-criminals (Buonanno, 2003). Education also alters preferences of individuals in the indirect ways, which have effect on the decision to adopt the criminal behaviour. As it increases the patience of individuals and higher education confirms the good job opportunities in legal sector (Loncher & Moretti, 2003).

The empirical results indicate that one unit increase in poverty may cause to increase in crimes rate by 0.075 units. Poverty can lead to high level of stress and mental illness which in turn causes individuals to adopt the criminal behaviour. It also decreases the opportunity cost of crimes and poor people find it more feasible to commit crimes. On the other side, estimated coefficients indicate that there is a significant and positive long-run relationship between the crimes rate and unemployment. The increase in unemployment rate may decrease the earning opportunities of the individuals which in turn may compel them to commit crimes. In addition to that, higher unemployment may lead to higher crimes rate due to depression or mental

illness associated with being unemployed. Higher unemployment decreases the rate of return of legal activities, and more likely to increase return of illegal activities. Hence, unemployment is one of the major contributing factors of high crimes in Pakistan. After evaluating the long-run estimates of our equation 3.3, there is need to explain the short-run determinants of crimes along with error-correction term. To assess the long-run relationship, error correction model is reported in Table 7.

Table 7- Error-Correction Estimates of Short-run.

Dependant variable - Crime Rate		
Repressor	Coefficients	t-Values
Δ GDPPC(-1)	-0.000711	-0.173252
Δ GDPPC(-2)	0.006442	1.453383
Δ HE(-1)	-6.66E-07	1.063446
Δ HE(-2)	-2.99E-07	-0.495997
Δ POV(-1)	-0.067076*	-2.936634
Δ POV(-2)	-0.102208*	-4.097718
Δ UN(-1)	0.211715*	4.083104
Δ UN(-2)	0.113907*	2.389337
Δ intercept	-3.663986*	-9.337890
ECM(-1)	-0.913973*	-9.930045

Diagnostic test statistics

	Test-statistics	p-values
Serial correlation	1.0647	0.3619
Normality	21.63	0.00002
Heteroscedasticity	0.6918	0.7798
ARCH test	0.0019	0.9653
Ramsey test	5.2577	0.0313
R-squared	0.835083	
Adjusted R-squared	0.766368	

Note: * indicates the 10% level of significance.

The results of ECM reported in Table 7 indicate that GDP per capita and crimes rate have a negative relationship for the first period but it is insignificant. They strongly support therefore that it does not work on the short-run. However, the increase in the time period gives us positive findings as explained on the long-run. The empirical results show that there is a negative relationship between the higher education and crimes rate on the short-run but it remains insignificant in the case of Pakistan. The short-run findings of GDP per capita and higher education support that both variables have no such role to influence the criminal behaviour in Pakistan.

Short-run ECM estimates indicate that there is a negative relationship between the crimes rate and the poverty in Pakistan that are contrary to the theoretical findings. The logical interpretation evaluates that the hope to be poor in the near future or the arrival of poverty in any family member immediately may not compel him to be involved in the illegitimate activities. He may wait for some time or for the best earning opportunities in the near future or for the hope that economic conditions may get better in the near future. In this way, poverty may decrease crimes on the short-run.

Empirical results on the short-run strongly support the existence of significant and positive relationship between the crimes rate and unemployment. High unemployment rates may decrease the earning opportunities for the individuals which in turn compel them to commit crimes. So, it is concluded that economic downturns may cause a rise in the crime rates of Pakistan. The coefficient of error-correction term is negative and significant and evaluates that all short-run variables may converge on the long-run. Thus, the speed of convergence is very high as 91.4% per year.

The value of R-squared shows that the model is relatively good as most of the variations are being explained by the explanatory variables and the model is free from any econometric problem. The results of diagnostic test statistics confirm the absence of serial correlation, heteroscedasticity, autoregressive conditional heteroscedasticity (ARCH) in our model. The Stability test is evaluated by applying cumulative sum of recursive residual (CUSUM) and cumulative sum of squares of recursive residual (CUSUMQ) technique developed by Brown *et al.* (1975). It indicates that there is convergence, which means that short run coefficient values move to their equilibrium or stable path (see, Figure 1 for ready reference).

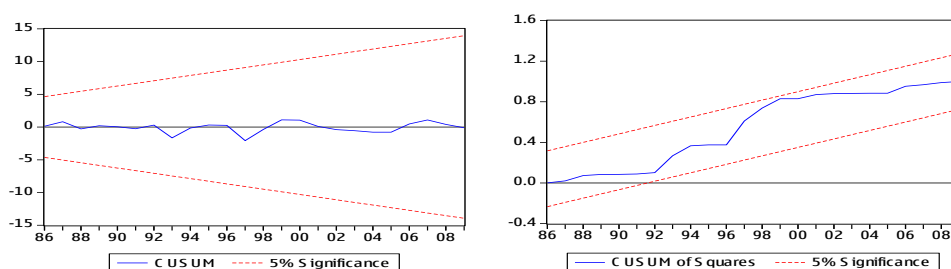


Fig. 1- Cusum model.

5. Conclusion

The criminal activities are hibernating day by day in the new millennium. Its basic aim is consistent to die out the social activities, spread over the terror, and kill the nourishing society. The main objective of the study is to examine the factors or socio-economic variables which are more responsible for increasing and decreasing crimes rate in Pakistan. The foremost conclusion of the study induces positive relationship between the crimes rate and the unemployment in both short and long-runs. Higher unemployment diminishes the rate of return of legal activities, and more likely to increase return of illegal activities. Hence unemployment is one of the major contributing factors of the high crime rates in Pakistan. The other outcome is that there is strong, significant and negative relation between the crimes rate and the higher education in short as well as in long-run. The pivotal outcome of the study evaluates that GDP per capita leads to higher crimes rate in long-run but decreases it in short-run. More income means that there are greater benefits for criminals as for thefts and robberies. It means that affluent areas attract more criminals due to the opportunities available to them. The last but not the least conclusion induce a positive relation between the crimes rate and poverty in the long-run but have negative relationship between both the variables in the short-run. In long-run, poverty can lead to high level of stress and mental illness which in turn causes individuals to adopt the criminal behaviour.

From the above discussion, it has been acknowledged that socioeconomic factors are more likely to determine all types of crimes in Pakistan. In addition to that, results also suggest a main concern of policies for keeping crimes rate low, as well as a priority of policies for the improvement of economic conditions. In order to reduce the crimes rate, Pakistan government needs to create more job opportunities in urban and rural areas that may reduce the burden of unemployed people from the economy. Besides, the government of Pakistan should alleviate poverty through different projects and programmes and also provide people with different opportunities of skill development. The government should focus on the security sector, notably police and law regulating authorities by enhancing their incentives, allowances and pays so they avoid the bribery and perform their duties efficiently and sincerely. Law regulations and rules regarding crime punishment should be very strict and the implementation of these laws and regulations must be obligatory and very strict. The government of Pakistan should promote education in order to create awareness among people.

REFERENCES

- Abbasi, A. (2010). Crime rate jumps up in two years, *Pak Media Reports*. 12th of January, 2011 from <http://www.pakalibansisation.com/?p=2848>
- Alexandros, G. & Nikolaos, D. (2010). The effect of socio-economic determinants on crime rates: An empirical research in the case of Greece with co integration analysis, *International journal of Economic Science and Applied Research*, 2: 2, 51-64.
- Andrienko, Y. (2003). Crime and wealth: Evidence from international crime victim surveys. Online: <http://www.cepr.org/meets/wkcn/7/756/papers/andrienko.pdf>
- Baharom, H. A. & Habibullah, S. M. (2009). Crime and inequality: The case of Malaysia, *Journal of Politics and Law*, 2:1, 55-70.
- Becker, G. S. (1968). Crime and Punishment: An Economic Approach, *Journal of Political Economy*, 76: 2, 169-217.
- Beki, C. Zeelenberg, K. & Van Montfort, K. (1999). An Analysis of the Crime Rate in the Netherlands, *British Journal of Criminology*, 39:3, 401-415.
- Brown, R. L. Durbin, J. & Evans, J. M. (1975). Techniques for Testing the Constancy of Regression Relation over Time, *Journal of Royal Statistics Society*, 37, 149-163.
- Brush, J. (2007). Does income inequality lead to more crime? A comparison of Cross-sectional and time-series analysis of United States counties, *Economics letters*, 96, 264-268.
- Buonanno, P. (2003). Identifying the Effect of Education on Crime. Evidence from the Italian Regions, Università degli Studi di Milano – *Bicocca* No.65.
- Buonanno, P. & Montolio, D. (2008). Identifying the socio-economic and demographic determinants of crime across Spanish provinces, *International review of Law and Economic*, 28, 89-97.
- Cerro, M. A. & Meloni, O. (2000). Determinants of crime rate in Argentina during the 90's, *Estudios de economia*, 27: 2, 297-311.

- Corman, H. Joyce, T., & Lovitch, N. (1987). Crime, Deterrence and the business cycle in New York City: A VAR approach, *The review of economics and statistics*, 69: 4, 697-700.
- Dutta, M. & Hussain, Z. (2009). Determinants of crime rates: Crime Deterrence and Growth in post-liberalized India. Online at <http://mpra.ub.uni-muenchen.de/14478/> MPRA Paper No. 14478, posted 05. April 2009 / 04:37.
- Edmark, K. (2005). Unemployment and Crime: Is There a Connection? *Scandinavian Journal of Economics*, 107:2, 353–373.
- Ehrlich, I. (1973). Participation in illegitimate activities: A theoretical and empirical investigation, *The Journal of Political Economy*, 81:3, 307-322.
- Elliot, C. & Ellingworth, D. (1992). The relationship between unemployment and crime: A cross-sectional analysis employing the British Crime Survey 1992, *International journal of manpower*, 16: 6/7, 81-88.
- Entorf, H. & Spengler, H. (1998). Socio-Economic and demographic factors of crimes in Germany: Evidence from panel data of the German states, *International Review of Law and Economics*, 20 (1), 75-106.
- Fajnzylber, P., Laderman, D., & Loayza, N. (2002). Inequality and violent crimes, *Journal of Law and Economics*, XLV, 1-40.
- Fischer, V. J. (2001). Determinants of Crime for Swiss Cantons with Particular Reference to Direct Legislation. Online available at: www.iew.uzh.ch/study/courses/ss04/382/downloads/fischer.pdf
- Gillani, M., Mahmood, S. Y., Rehman, H., & Rashid, A. (2008). Unemployment, Poverty, Inflation and Crime Nexus: Co integration and Causality Analysis of Pakistan, *Pakistan Economic and Social Review*, 47 (1), 79-98.
- GoP (2012). Government of Pakistan, Economic Survey of Pakistan (2011-12), Bureau of Police Research and Development, Islamabad, Pakistan.
- GoP (various issues). Government of Pakistan, Economic Survey of Pakistan (various issues), Bureau of Police Research and Development, Islamabad, Pakistan.
- Gumus, E. (2004). Crime in urban areas: An empirical investigation, *Akdeniz I.I.B.F. Dergisi*, 4 (7), 98-109.
- Hartung, G. & Pessoa, S. (2000). Demographic factors as determinants of crime rates. Online available at: www.abep.nepo.unicamp.br/.../docs/SemPopPob07_1062.pdf
- Herzog, S. (2005). The Relationship between Economic Hardship and Crime: The Case of Israel and the Palestinians, *Sociological Perspectives*, 48: 2, 189-211.
- Iqbal, M. M. & Jalil, H. H. (2010). Urbanization and crime: A case study of Pakistan, Presented at 26th Annual General Meeting of PSDE, Pakistan Institute of Development Economics, Islamabad, Pakistan.
- Ishikawa, M. (2009). A relationship between economic conditions and crime rate. Online available at: <http://userwww.sfsu.edu/~ishikawa/documents/Economic%20Conditions%20and%20Crime%20Rate.pdf>
- Kustepeli, Y. & Onel, G. (2006). Different Categories of Crimes and their Socio-Economic determinants in Turkey: Evidence from the Vector Error Correction Model. Online available at: http://www4.ncsu.edu/~gonel/docs/crime_kustepeli_onel.pdf.
- Lancher, L. (2007). Education and crimes, a review of literature, University of western Ontario Dec 2007.
- Lin, J. M. (2007). Does democracy increase crime? The evidence from international data, *Journal of Comparative Economics*, 35:3, 467-483.
- Loncher, L. & Moretti, E. (2003). The effect of education on crime: Evidence from prison inmates, Arrest, and Self-reports, *American Economic Review*, 94(1): 155–189.
- Machin, S. & Meghir, C. (2004). Crime and Economic Incentives, *The Journal of Human Resources*, 39: 4, 958-979.
- Merton, R. (1938). Social Structure and Anomie, *American Sociological Review*, 3:6, 72–82.
- Saridakis, G. (2004). Violent crimes in the United States of America: A time series analysis between 1960-2000. Discussion Papers in Economics 03/14. Online available at: <http://www.le.ac.uk/economics/research/discussion/papers2003.html>
<http://hdl.handle.net/2381/4423>
- World Bank. (2012). World Development Indicators (WDI). Washington, DC. <http://www.worldbank.org/data/wdi2012>.