

***Socio Economic and Demographic
Determinants of Crimes: A Panel Data Analysis.***

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Abstract

Crimes are one of the most harmful social problems throughout the world which are affiliated with mankind till the life had started on this earth. Scholars have been found many justifications about the variations in committing crimes and suggest that the topic of crime is one of the most important research areas within the field of economics. This study explores those factors which force an individual to involve in any illegal activity, so called crime. The impact of inflation, unemployment, wage rate, population and GDP on total crime, property crime, violent crime and all types of crime separately is examined by taking the panel dataset from the range 1995 to 2010 of fourteen selected nations from east, west, north and south Asia. The GMM is used as estimation technique. The key finding of the study is that inflation unemployment and population growth guide the mix results against crime rate, however, wage rates decrease crime rate in Asian countries. These important economic and demographic elements consistently become the source of rise in crimes and there is need of the time that to develop a crime free society these economic and demographic factors should seriously deal.

Keywords: Total Crimes, Property Crimes, Violent Crimes, GDP, Population, Inflation and GMM

Chapter 1

Introduction

1.1. Background:

Crimes have continuously surrounded every culture in any social setup. Crimes are associated with the creation of mankind. Cain did the first crime on this earth by murdering his brother Abel, just because of distrust. Crime is treated as unexpected behavior of a single or group which is against law (Al-Quran)¹. There are many reasons of this blunder, sometime just because of mental stress, financial issues and sometime just because of habit. Crime means that an action or blunder of an individual or group which is damaging to others and the government putt its efforts to stop this. The major issues which become the cause to increase crimes are gross less domestic product (GDP), unemployment, population density and unfair labor market; furthermore there are some other socio economic and demographic factors like lawlessness, fundamentalism, inflation and double standard prevailing in the society Dr. Aurangzeb (2012).

Due to rapid increase in crime, the policymakers and the criminologists have been paying attention on crime prevention. Moreover, the Association of Southeast Asia Nation (ASEAN) has been inspired by the international countries to promote the cooperation for control of crime in a region mutually. The United Nations also reports that crime is both the cause and effect of poverty, uncertainty and under-development, thus crime control should the major concern of all country's policymakers (UNODC, 2005). Becker (1968) has presented a concept which altered the mode of philosophy about the illegal performance of people. He has developed a model which is the first one about the illegal preference that most of the people have done crime to get the economic benefits which could not fulfill by the authorized way. This paper of Becker has opened the new horizons of experimental study which has the key purpose to find out the socio-

¹ (Surah Al-Ma'idah, 27-31)

economic factors that affect crimes. Crimes are strongly linked to poverty, social exclusion, wage rate and household contextual. Economics of crime guides that there is need to study those factor which can cause the rise in crimes in different western states and eastern countries.

A study² conducted by United Nations that concludes that the 40% of all worlds' resources are occupied by the only 1% people of the world in start of this century. The assets which have almost forty eight nations are less than that are occupied by the only three richest people of the world.

1.2. *Motivation of this study:*

The theory supports the connection among crimes and economic, social demographic, psychological and institutional components. This study focuses on economic, social and demographic factors that affect crime as total as well as disaggregated crime rate. The main motivation of this study is that during the last two decades the crime rate has been increasing worldwide. The understanding of these factors at disaggregated level enables the authorities to control or reduce these crimes. This study investigates socio-economic and demographic factors that are responsible for increase in crime by taking the countries from all four regions, East, West, North and south of Asia. Those variables are selected which have already identified in the empirical literature of crime this study and these factors seems to be responsible in increasing crime rate in Asia.

The influence of financial illnesses on society relate with the unlawful inspiration, while criminal opportunity affect the accessibility and openness of criminal targets through routine behavior. Generally an economy with less resource will raise the crimes due to the burden that a single feels to attain the specific objectives. Unemployment may have a direct relationship with

²The World Institute for Development Economics Research

crime through increasing wrong inspiration for those employed persons which have fear to become jobless or unhappy with the existing job and unemployed as well. Crimes are looking more attractive in the recession in any economy when an individual facing the uncertainty to survive in the future life and if the substitute is life in poverty. Unemployment and crime association on the base of United States data, Chiricos (1987) determines that there exist a direct relationship among crimes and unemployment. He has found that property crimes are more affected by unemployment than on violent crime. Levitt (2001) sum up his study that there is almost two percent increase in property crime with 1% increase in the unemployment but violent crimes are not affected accordingly and the lagged unemployment rate neither effect property nor violent crime. For this conclusion panel data approach is to be used at provinces and cities of US.

There is an important role of crime in the most countries on economic point of view but association between GDP and crime rests uncertain. The hypothetic link among these variables is vastly complex because there is both positive and negative impact of GDP on crime exist. Possibly the hypothetical bond between crime and GDP is relatively complex. GDP is one of the main causes related to the crime and it may have effect on crime both in negative and positive way in the case of short-run and the long-run as well. For complete understanding the association among GDP and crime it is necessary to know the notion of GDP. Purpose of economic institutions is to confirm the maximum accessibility of all types of productions and services to the participants of nation³. GDP means the value of all final production of an economy but it fails to do so in various ways, one of them is that GDP typically fails to include income generated in an underground economy⁴. Paolo and Daniel (2005) concluded that GDP has positive impact on property crimes for the case of Spanish countries. On the other hand, as with

³See Varian, 1992

⁴United Nations, 2008

the decrease in GDP, people become poorer and to fulfill the needs results in increase in certain crimes. Now with the help of the analysis of this study, it is an effort to search out impact of GDP on crimes and also to find that which type of crimes are more affected by GDP.

Wage rate is a key element which must be involve in the criminal actions because low wages become limited a consumer to spend freely. Expenses are boosting up with every passing day so if the wage rates are not increasing accordingly then to survive well in the society, the individual step forward to commit crime. Wilson (1996) and Winter, Ebmer and Raphael (2001) reported that decreasing wage rate have chances that unskilled men will contribute into the criminal activities. The link among crime and labor markets is not only the area of interest for students but policy makers also show great attention to understand this association. Gould et al (2002) uses panel regressions for the data from 1979-1997 and conclude that both wage rates and unemployment of low-skilled males affects crime, and that the effect of wages on crime is greater than the effect of unemployment.

There is a huge amount of literature available about the relationship among crime and the main economic factors in nations like UK, German, US and Italy. In different Asian countries some empirical work is also done for the analysis of the determinants of crime, like in Pakistan the determinants of crime are studied by Aurangzeb (2012), in Iran the socio-economic and demographic determinants of crime are examined by Haddad and Moghadam (2011) and in Malaysia the Linkages among inflation, unemployment and crime rates is investigated by Foon tang, (2009) among others.

1.3. Purpose of this study:

The main objective of this study is to do an analysis at the socio-economic and demographic factors which are liable in endorsing crimes. This study focuses to find out those factors which are more liable that force an individual to commit such an illegal activity so called Crime either violent or property crime by taking the different fourteen economies⁵ from East, West, North and South Asia. More Specifically the objectives are

- To investigate socio-economic and demographic determinants of total crime.
- To examine these determinants for disaggregated crimes that is for property crimes and violent crimes.
- To examine these determinants more deeply by taking the crimes decomposed into Robbery, Theft, Assaults and Homicides.

1.4. Significance of the Study:

Most of the studies which have come into seen are done about the responsible economic factors that force an individual or group to commit crimes are based on single nation and mostly the time series analysis is used in Asia.

1. This study put an effort by taking one step forward to examine factors which either socio-economic or demographic like population for the case of fourteen Asian nations by using their panel data set. In this research all reported crimes, property crimes and violent crimes are analyzed in separate models.

⁵Pakistan, Kyrgyzstan, Hong Kong, Japan, Magnolia, Korea, India, Armenia, Azerbaijan, Georgia, Turkish Cyprus, Turkey and Thailand, Tajikistan

2. Another specification of this study is that all types of crimes are also evaluated individually for the economic factors to conclude that which factor is more responsible for increasing the crime rate.
3. This study identifies factors that are responsible for increasing crime rate in Asia which is important to academicians, researchers, law enforcement authorities and policy makers in the region.

1.5. Contribution of this Study:

This study contributes to existing empirical literature in several ways.

1. First this study increases the understanding of socio-economic like inflation, unemployment etc. and demographic factors like population that affect crime as total as well as disaggregated crime rate for Asian region. This region has high population growth and it is going to be more growing region of the twenty first century. The one of the main hurdle in hindering growth is increase in crime rate and this analysis can be useful for researchers, academicians, law making authorities and policy makers. The understanding of these factors at disaggregated level enables the authorities to control or reduce these crimes.
2. This study contributes by selecting the most appropriate estimation technique GMM of Arellano and Bond that deals with endogeneity, heteroskedasticity and other panel data matters.

1.6. Organization of the Study:

After introduction chapter the remainder of the study is organized as follows. The chapter 2 reviews the relevant literature in the area of social, economic determinants of crimes, where the studies mentioned that how the variations in different economic factors has become the reason of promoting the anxiety of any individual or a group which force them to commit crimes. The following literature also guides that in different regions of the world these economic factors have been played different role in the case of crimes. In chapter 3 the process of all econometric techniques which has been used for the analysis along with data sources and descriptions of the variables are presented. In the chapter 4, it is organized how the economic factors became the reason of rise in crimes for the panel of Asian countries. The results of total crimes, violent crimes, property crimes and then all the crimes at individual level where economic factors are taken as explanatory variables presented. Chapter 5 consists of concludes and presents policy recommendations.

Chapter 2

Literature Review

Criminal activities are the basic hurdle in the way of constructing a peaceful and welfare society. That's why for every governing body it is a common issue to search out those components which become the reason of committing an illegal activity by an individual. This chapter reviews the previous empirical studies on the determinants of crime for the different regions across the world to detect the cause of increase in crimes.

A time series approach for the period 1964 to 2008 is used in a recent study by Jalil and Iqbal (2012) to determine the link among urbanization and crimes for the case of Pakistan. Johansen co-integration approach has been applied for the variables urbanization, unemployment, education, income inequality and crime. They have found a significant direct association between urbanization with crime. They suggest to policy makers that migration to urban areas for searching jobs needs to reduce by providing the employment opportunities in rural areas of Pakistan to control the crimes due to urbanization.

In another study Gronqvist (2011) has examined that the youth who are unemployed is a vital factor of crime by investigating the linkage among crime and unemployment. Labor market and conviction data for working population of Sweden is used and result indicates that unemployment has major effect on crime.

Nikolaos and Gkanas (2011) have been used yearly data set for the range 1971 to 2006, to investigate the causes of crime by applying co integration technique in Greece. Crimes, unemployment, real return and migration are to be measured as variables. They have concluded that there exist a positive significant relationship among crimes and the variables in case of long run. Steven and Melissa (2011) have found a positive impact of physical transfer in rural and

urban zones, unequal distribution of income, and poverty on crime. They have used country level data from 1990 to 2000 to find out the association of crimes with unequal distribution of income and poverty in United State with taking Structural shifts, income inequality, crime rate, and poverty as variables. To examine the results regression analysis technique has been used.

For panel combined dataset for all Baltic counties⁶from the year 2000 to 2005, Lauridsen (2011) has examined the connection among the crimes of this regions and economic rationality significantly. The regression analysis technique is used to find out the relationship. The results indicate that people with less income, foreigners, unemployed adults and urban groups are taken as variables. A time series analysis is to be used for more than 30 years data in Jamaica to investigate the socio economic determinants of crime by Gilbert and Sookram (2011). By applying Granger causality test on the variables the conclusion leads towards the prominent impact of social expenditure as percentage of GDP on crimes.

Holman and Fernandez (2011) have used Regression analysis technique for yearly data for the range 1990 to 2002 in United States to examine the outcome of wage rates on the types of crimes. The estimated results based on the variables homicide rate, auto theft, living wage, robbery and burglary. They find out that living wages have a positive significant relation with crime rate. Another panel data set is to be used in Uruguay for the period of 1986 to 2006 to investigate the economic, social, and demographic determinants of crime by Fernando and Gonzalez (2010). Generalized Method of Moments (GMM) technique has been used for the analysis by taking crime rates, real income per capita and head of household's education, youth unemployment, urbanization rate, and population density as variables. They found that population density and urbanization rate is directly related with crime, but the prevention elements are important to decline crimes and there is no major impact of socioeconomic factor

⁶Three countries east of the Baltic Sea (Estonia, Latvia and Lithuania)

on crime's rate. Dutta and Husain (2009) have included another new variable "quick disposal of case" with urbanization, poverty, education, load on police force and economic growth to investigate the determinants of crime in India. State level data set is to be used from 1999 to 2005. They conclude that socio-economic and demographic variables as well have significant effect on crime by using SURE model technique.

To check the impact of unemployment on crime for European countries Altindag (2009) has used the country level data. Unemployment, police force, GDP and urbanization are considered as variables. Ordinary least square (OLS) technique has been used for the analysis. The findings show that the rate of unemployment of male having less education is comparatively significant in driving than the impact of the whole rate of unemployment and crimes. By using panel data approach by Sandiego and Lee (2009) investigates the effect of increasing unemployment rate and crime rate. By taking unemployment rate, crime rate, anxiety, and unemployment insurance as variable he argues that the effect of unemployment on crime is negative on low apprehension rate but positive on high rate of apprehension. The effect depends on apprehension rate. In another study by using panel data approach Muroi (2009) explores the factor of crime by comparing Uniform Crime rate (UCR) with National crime Victimization Survey (NCVS). Co relational technique has been used by taking the variables unemployment rate, poverty rate, population (black and white) and population density. The empirical results express that demographic variable in this analysis have no impact on crimes significantly but in NCVS type of analysis these variables have major impact on crime.

A large panel data set from 1194 to 2003 is to be used in Iran by Moghadam and Haddad (2008) for the investigation of the socio-economic and demographic determinants of crime. Regression analysis technique has been used by considering rate of literacy, rate of

unemployment, migrant, population and overall family income as variables. They found that the economic issues are positively related to the crimes significantly while demographic variables have impact at some types of crime which are included in total crimes. For policy makers they recommend that economic development is essential to the adjustment of crimes in Iran.

By using simple regression analysis at country level data for the sixteen states, Trogon, (2006) determine the relationship between unemployment and crimes. Variables are per capita income, age, population (black and white) and amount of federal funding for education considered. He has found the significant positive influence of rate of unemployment on crime rate. Another study with panel data set of 1993 to 1999 in Spain by Montolio and Buonanno, (2005) has concluded that the socio-economic determinants have significant positive impact on property crime while demographic factors are linked with violent crimes. Generalized Method of Moments (GMM) estimation technique has been used. In Argentina for the period of 1990 to 1999 a study is conducted by Maria and Meloni (2004). They have reported a significant connection among rate of unemployment, income inequality and crime rate. For this analysis Co relational technique has been used.

The rate of unemployment, inflation rate and crimes has been discussed at yearly data for the series of 1970 to 2006 in Malaysia by Tang (2004). He has concluded that inflation and unemployment rate have the significantly positive relation with crime while inflation rate has not positive impact on crime rate in case of short run. For the analysis Bartlett Corrected trace test technique has been used by considering Crime rate, inflation and unemployment rate as variables. By using Generalized Method of Moment (GMM) technique Neumayer (2004) examined the relationship among crimes, rate of unemployment, female labors, economic

growth, democracy and inequality for the dataset of the range 1998 to 2002 in London. He has found that property crimes are comparatively more affected than violent crimes by inequality.

Fajnzylber and Iederman (1999) found the determinants of crime rate by taking GDP, urbanization rate, Gini index, drugs, and income as variables in Latin America for the range of 1970-1994. To study the relationship between rate of unemployment and crimes of the data series of the range of 1984-1996 in New Zealand for 16 counties by Papps and Winkelmann (1999) argues that unemployment is significantly affect the crimes by using the technique of fixed and random models. Another analysis has been done about the relationship between unemployment and crimes by Raphael and Ebmer (1999) investigate that there is direct significantly impact of the rate of unemployment on property crime but for violent crime the effect is comparatively much weaker. By including time drifts, country and year specific US country level data is used in the analysis.

Economic elements played a vital role in the society and specifically the above literature is about the impact of these economic factors on crime which shows that in everyday life how crimes are associated with the variations in these determinants at all stages. The literature has provided the evidence that world has now become a global village and all the nations are linked to each other with their economic wants, so there is need to discuss social, demographic determinants of crimes across the nations. The gap has come to seen, how economic factors can affect the crime rate across the countries and also which factors is more responsible for increase in crimes on whole and at separate level as well. This study is a contribution in the existing literature related to the crime by including the selected Asian countries from east, west, north and south Asia to fulfil that gap and these elements are not used in any study according to this schedule.

Chapter 3

Methodology and Data

This study is investigating the connection among overall crime, property crime, violent crime and economic factors. That's why to determine the empirical relevance of the socioeconomic and demographic measures with crime for the selected Asian countries, here in this study it is developed different models by taking the types of crime and try to find out the exact determinants of crime by including the various views from the certified literature. This chapter provides the theoretical framework underling the analysis in section 3.1, Empirical model specification in section 3.2 and variable description in section 3.3. variables description in section 3.3, data in section 3.4, estimation technique in section 3.5 and econometric model in section 3.6 respectively.

3.1. The Theoretical Framework:

Many theories have been developed to identify the various factors that cause in increasing crimes. Classical criminology theory, Siegel, (2001); Barkan, (2006), Vold, Bernard, & Snipes, (2002), and Williams & McShane, (1999) argue that an individuals have free will to commit or avoid crime and for both options there exists many reasons.

A School of thought believed that behavior is influenced by the social and physical environment. (Williams & McShane, 1999), Urbanization is seen as the source of crime, as there are more people moving to the city than there are jobs for them because large numbers of unemployed people became a burden.

Anonymous (2002) has developed theory called "Broken windows theory", in which he argues that social disorganization leads to an increase in vandalism, gangs, and the sale of narcotics and will also lead to an increase in burglary, robbery, and theft.

Smith and Jarjoura (1988) also agree with the social disorganization theory. Crimes and social disorganization are believed to derive from poverty, unemployment, population density, and low collective efficacy.

Harms (2000). 'Strain theory' focuses on conflict between goals and means. It considers that unequal distribution of wealth and power causes frustration which will lead to the alternative illegal methods of reaching goals, such as robbery and theft.

It is widely believed that the poor commit more of the crime, at least street crime. However, it is more linked to property crime, not violent crime (Chester, 1976) and Greene (1993). By discussing this, Arthur (1991) also has concluded that the poor have a greater motivation to steal to satisfy their means. Furthermore he has pointed out there is a positive correlation between crime rates and socio-economic factors, like per capita income, inequality, and unemployment rates. However, there is a negative relationship between crime and the percentage of the population below the poverty line.

Crouch (1996) suggests that individuals in poor families and communities are more likely to steal, rob, sell drugs, and otherwise make illegal gains. Vold, Bernard and Snipes (2002) conclude that in wealthy communities property crimes are more because there is enough to steal while there is little property crime in poor communities because there is no inequality. Everyone is equally poor. And at macro-level, an increase in unemployment is accompanied by an increase in crime rates.

Finally it can be said according to the above some theories that there may be many causes of crime, such as, unemployment, poverty, divorce, broken homes, poor schools, poor housing quality, inflation, racial and ethnic mix, residential mobility, unemployment, inflation and

population turnover etc. Based on the above theoretical literature and empirical literature the following empirical model is developed.

3.2. Empirical Model Specification:

For analysis of factors effecting crime the following model is estimated as suggested by Danziger and Wheeler (1975)), Cohen (1981), Cohen and Felson, (1979) and Sheley, Devine and Smith, (1988)⁷:

$$Cr = f(GDP, Un, Wr, Inf, Pop) \dots\dots\dots (3.1)$$

Where

- *Cr* = All registered Crimes,
- *GDP* = Gross Domestic Product.
- *Wr* = Wage Rate,
- *Inf* = Inflation Rate,
- *Pop* = Population Growth
- *Un* = Current Unemployment Rate.

To construct the model with relevant studies by Danziger and Wheeler (1975)), Cohen (1981), Land and Felson (1980) and Zarkin and Cook (1985), Cohen and Felson, (1979) and Sheley, Devine and Smith, (1988) suggested for the model a log-log model specification. There may be strong relationship among crimes and rate of current unemployment and unemployment of the previous one and two years, so in the model all three should be included for the better analysis. Therefore it is specified that the above function of overall and individual crimes with other variables are represented in the following equations:

$$\ln(Tc_{it}) = \alpha_i + \ln(Tc_{it-}) + \beta_1 \ln GDP_{it} + \beta_2 \ln(Un_{it}) + \beta_3 \ln(Un_{it-1}) + \beta_4 \ln(Un_{it-2}) + \beta_5 Wr_{it} + \beta_6 Inf_{it} + \beta_7 \ln(pop)_{it} + \mu_{it} \dots\dots\dots (3.2)$$

⁷ Others are Land and Felson (1980) and Zarkin and Cook (1985)

Where $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ and β_7 are the coefficients of GDP, unemployment of current and lagged one and two years, wage rate, inflation and population respectively while μ_{it} is the error term. It is expected that β_1 is negative with general perception when prosperity increase the number of crimes decreases. β_2 , the coefficient of unemployment which may be positive that leads to the direct relation with number of crimes, means that more unemployment causes the rise in crimes. In a panel study of 16 counties in New Zealand by Papps and Winkelmann (1999) argues that unemployment is significantly affecting the crimes. β_3 is the coefficient for the wage rate, expectedly negative sign that leads to the inverse relationship among crime and wage rate. (Raphael and Ebmer: 2001) and Wilson (1996) reported that by decreasing wage rate chances that human contribute to the criminal activities. β_6 is the coefficient of inflation which has expected a direct relation with crime, that means increase in inflation become the cause of increase the number of crime. Chung (1993) has established a result that rate of inflation in United States was directly related with all types of crimes, violent crimes and property crimes. β_7 is the coefficient of population growth which may be positive that means increasing population guides towards the increase in number of crimes.

Now there are models for property crimes and violent crimes with the same economic elements which represents that how these factors affect the violent and property crimes. In these models property crimes and violent crimes are denoted by Pc and Vc respectively.

$$\ln(Pc_{it}) = \alpha_i + \beta_1 \ln GDP_{it} + \beta_2 \ln(Un_{it}) + \beta_3 \ln(Un_{it-1}) + \beta_4 \ln(Un_{it-2}) + \beta_5 Wr_{it} + \beta_6 Inf_{it} + \beta_7 \ln(pop)_{it} + \mu_{it} \dots \dots \dots (3.3)$$

$$\ln(Vc_{it}) = \alpha_i + \beta_1 \ln GDP_{it} + \beta_2 \ln(Un_{it}) + \beta_3 \ln(Un_{it-1}) + \beta_4 \ln(Un_{it-2}) + \beta_5 Wr_{it} + \beta_6 Inf_{it} + \beta_7 \ln(pop)_{it} + \mu_{it} \dots \dots \dots (3.4)$$

After the investigation of these, the study proceeds to the deep analysis by taking the crimes (Robbery, Theft, Assaults and Homicides) as dependent variables like as,

$$\begin{aligned} \ln(Rob_{it}) = & \alpha_i + \beta_1 \ln GDP_{it} + \beta_2 \ln(Un_{it}) + \beta_3 \ln(Un_{it-1}) + \beta_4 \ln(Un_{it-2}) \\ & + \beta_5 Wr_{it} + \beta_6 Inf_{it} + \beta_7 \ln(pop)_{it} + \mu_{it} \dots \dots \dots (3.5) \end{aligned}$$

$$\begin{aligned} \ln(Thf_{it}) = & \alpha_i + \beta_1 \ln GDP_{it} + \beta_2 \ln(Un_{it}) + \beta_3 \ln(Un_{it-1}) + \beta_4 \ln(Un_{it-2}) \\ & + \beta_5 Wr_{it} + \beta_6 Inf_{it} + \beta_7 \ln(pop)_{it} + \mu_{it} \dots \dots \dots (3.6) \end{aligned}$$

$$\begin{aligned} \ln(Aslt_{it}) = & \alpha_i + \beta_1 \ln GDP_{it} + \beta_2 \ln(Un_{it}) + \beta_3 \ln(Un_{it-1}) + \beta_4 \ln(Un_{it-2}) \\ & + \beta_5 Wr_{it} + \beta_6 Inf_{it} + \beta_7 \ln(pop)_{it} + \mu_{it} \dots \dots \dots (3.7) \end{aligned}$$

$$\begin{aligned} \ln(Hom_{it}) = & \alpha_i + \beta_1 \ln GDP_{it} + \beta_2 \ln(Un_{it}) + \beta_3 \ln(Un_{it-1}) + \beta_4 \ln(Un_{it-2}) \\ & + \beta_5 Wr_{it} + \beta_6 Inf_{it} + \beta_7 \ln(pop)_{it} + \mu_{it} \dots \dots \dots (3.8) \end{aligned}$$

3.3. *Description of variables:*

The variable Crime is discussed earlier in the introduction section, as define that crime is a harmful act or blunder committed against the community in violation of a public law which the State needs to prevent. Each country sets out the series of crimes which are prohibited and punishes by fine, imprisonment or both.

Now the other variables like the types of crime and the economic factor, which can cause the crime rate are to be discussed. Writing about those types of crime which are to be discussed in the above models and commonly committed by the individuals, first it is necessary to tell that Property crime contains Theft and Robbery while violent crime consists of Homicide and Assault. Their further description according to the literature and data collecting sources are as under:

- **“Robbery”** contains the crimes of theft of assets from an individual by using force or its warning. By excluding blackmailing and pick pocketing this classification of crime consist of theft with strength. It should also include theft from any habitation place or a home, workshop or office simply saying that where possible by using false keys.
- **'Assault'** can be define as any physical violence alongside with the body of another individual causing a serious damage but offensive/erotic attack, extortions or slapping will be omitted.
- **'Theft’** when an individual is robbing somebody or institute without force with this objective that it will kept. Robbery, housebreaking and stealing of that vehicle, which are documented separately excludes from theft.
- **“Homicide”** is that crime where unauthorized death persistently imposed on an individual or a group by another individual.

- **“Inflation”** as calculated by the consumer price index (CPI) replicates the yearly percentage variation in the cost to the average consumer of attaining a carrier of services and goods that may be static or different at indicated breaks yearly. To calculate the inflation rate, the formula which is used written as under

$$i = \frac{CPI_t - CPI_{t-1}}{CPI_{t-1}}$$

- **“Gross domestic product” (GDP)**, states as the total worth that goods and services manufactured inside a country throughout an assumed year. GDP measures final production by including only goods and services purchased by their final users and counts only the goods and services produced within the country's borders during the year, whether by citizens or foreigners. “GDP is calculated for the market value of all ultimate services and goods formed inside an economy throughout a specified time frame, commonly a year⁸”. Financial transactions and transfer payments do not represent current production that’s why these will be excluded.
- **“Unemployment”**, According to the International Labor Organization (ILO), it is defined as that the workers who are presently jobless but have wish and capable to do any occupation for salary and have aggressively explored for employment. So **“Unemployment rate”** is the amount of jobless individuals by way of the percentage of the whole amount of those individuals who are being unemployed or employed.
- **“Wage Rate”** A monetary payment which is paid to an employee in exchange for work done. It may be calculated as a fixed amount and given to the worker when each job completed. It may be at an hourly or everyday rate, or based on quantity of work done.

⁸See; Mankiw and Taylor, 2006

- **“Population”** Population means the people living in a particular region or a country and the population growth is the increase in the number of people that reside within a state or country which can be calculated by the formula:

$$Pop\ growth = (Birth\ rate + emigration) - (Death\ rate + emigration).$$

3.4. *Data Sources:*

Since the yearly data is collected for the countries, Pakistan, Kyrgyzstan, Hong Kong, Japan, Magnolia, Korea, India, Armenia, Azerbaijan, Georgia, Cyprus, Turkey, Thailand and Tajikistan from the period of 1995 to 2010. For this Panel data analysis, the source to collect the data about crime is United Nation of Drug and Crime (UNODC) and reports publish by Pakistan Police Department while the data for other variables are collected at World data bank (WDI), International Monetary Fund (IMF) and International Labor Organization (ILO).

3.5. *Estimation Technique*

Using of panel data analysis instead of a simple time series or cross-section is to regulate the unseen heterogeneity across the countries, which significantly decreases the probability of an omitted variable bias.

Several econometric problems may arise during the estimation of the above models.

- Time-invariant states features (fixed effects), which are geographic and demographics, may be interconnected with the independent variables. The fixed effects are enclosed in the error term which consists the unobserved state specific effects, v_i and the observation specific errors e_{it}

$$u_{it} = v_i + e_{it}$$

- The existence of the lag dependent variable Cr_{it-n} and the unemployment of lagged one and two year such as Un_{it-1} and Un_{it-2} give rise to autocorrelation.
- In this study the panel dataset has a short time dimension.

Here the time period is short so the relevant literature guides when T is small, the estimators are asymptotically random and when T is large the un-weighted GMM estimator may be inconsistent. Some special cases of such situations are studied in Saiger and Stock (1997), Stock and Wright (2000), among others and Hanand and Phillips (2006), latter in a general context that includes some panel cases. Methods to avoid these problems were developed by Arellano and Bover (1995), Blundell and Bond 1998), and more recently by Hsiao, Pesaran, and Tahmis-cioglu (2002). Arellano and Bover (1995) and Blundel and Bond (1998) proposed a system GMM procedure that uses moment conditions based on the level equations together with the usual Arellano and Bond type orthogonally conditions. Furthermore that's why for the analysis “**The Arellano-Bond GMM**” technique is to be used.

3.6. *Econometric Methodology:*

The econometric methodology consist of unit root tests to identify that whether there exist a problem of unit root in the data or not because in panel data set there may exist the problem of unit root. And a non-stationary data leads towards the spurious results. Furthermore, the correlation matrix approach has been used to tackle the problem of multi-collinearity among the explanatory variables. After analyzing the data set is as per requirement GMM method approach has been used to conclude the arguments about the relationship between these economic factors and crimes. GMM method potentially removes the problem of endogeneity which can be occurring due to the presence of lag dependent variables among the repressors. AR

(1) and AR (2) process has been used to check whether the problem of serial correlation has been removed by using instruments. J-statistics follows the chi square distributions, which has been used to check the validity of over identify restrictions. The detail process of all these are discussed as under:

3.6.1. Panel Unit Root:

3.6.1.1. Levin, Lin and Chu (LLC) test:

Levin, Lin and Chu (LLC) test is for unit root, developed by Leivin and Lin with co-author Chu and published in 2002 finally. They have adopted a test which is in fact the extension of DF test. Their model is in the following form;

$$\Delta Y_{it} = \alpha_i + \rho Y_{it-1} + \sum_1^k \phi_k \Delta Y_{i,t-k} + \delta_i t + \theta_t + \mu_{it}$$

This test allows two way fixed effects, one coming from α_i and the second from θ_t . So both unit specific fixed effects and unit specific time effects are included. According to the most of the unit root tests they also consider that both cross section and individual process are independent. This method formulate null hypothesis as:

$$H_0: \rho = 0$$

$$H_a: \rho < 0$$

Here the null hypothesis states that the series contain the problem of unit root while alternative about no unit root.

3.6.1.2. Im, Pesaran and Shin (IPS) Test:

LLC test has a drawback of the homogeneous ρ across all i . by allowing heterogeneity, Im give the extension to LLC test and proposed the procedure of separate estimation for each cross section by allowing the different specification about the lag length, residual variance and the parametric values. The IPS model and test statistics are as under on the base on averaging the Individual unit root test statistics.

$$\Delta Y_{it} = \alpha_i + \rho Y_{it-1} + \sum_{k=1}^n \phi_{ik} \Delta Y_{i,t-k} + \delta_i t + \mu_{it}$$

The following hypothesis is used to test the unit root in which the existence of unit root for the null and alternative is that the series is stationary.

$$H_0: \rho = 0 \text{ For all } i$$

$$H_a: \rho < 0 \text{ For atleast one } i$$

$$\bar{t} = \frac{1}{N} \sum_{i=1}^N t_{\rho i}$$

$$t_{ips} = \frac{\sqrt{N}[\bar{t} - 1/N \sum_{i=1}^N E(t_{iT} | \rho_i = 0)]}{\sqrt{Var[t_{it} | \rho_i = 0]}}$$

Finally they also proved the standard normal distribution as $T \rightarrow \infty$ is followed as $N \rightarrow \infty$ serially

3.6.2. Correlation Matrix:

Correlation among the explanatory variables indicates the problem of the multicollinearity. The Problem of high multicollinearity leads to the biased assessments. To proceed in further estimation process, it is necessary to check the multicollinearity between the independent variables. There are various ways to detect the problem of multicollinearity like correlation coefficients and auxiliary regression. Here in this case before going to the analysis, correlation matrix is formed to check that how much correlation among the variables.

3.6.3. Arellano and Bond GMM:

Arellano and Bond (1991) argue that additional instruments can be obtained in a dynamic panel data model if one utilizes the orthogonality conditions that exist between lagged values of Y_{it} and the disturbances v_{it} . Let us illustrate this with the simple autoregressive model with no repressors:

$$y_{it} = \alpha y_{it-1} + u_{it} \dots \dots \dots (1)$$

Where, $i = 1 \dots \dots N$ and $t = 1 \dots \dots T$

$u_{it} = \mu_i + v_{it}$ with $\mu_i \sim \text{IID}(0, \delta_\mu^2)$ and $v_{it} \sim \text{IID}(0, \delta_v^2)$ independent of each other and among themselves. In order to get a consistent estimate of δ as $N \rightarrow \infty$ with T fixed, first take the difference of eq (1) to eliminate the individual effects

$$y_{it} - y_{it-1} = \alpha(y_{it-1} - y_{it-2}) + (v_{it} - v_{it-1}) \dots \dots \dots (2)$$

and note that $(v_{it} - v_{it-1})$ is MA(1) process with unit root. Consider that for $t=3$, the first period it is observed that the following relationship,

$$y_{i3} - y_{i2} = \alpha(y_{i2} - y_{i1}) + (v_{i3} - v_{i2}) \dots \dots \dots (A)$$

In this case, y_{i1} is a valid instrument, since it is highly correlated with $(y_{i2} - y_{i1})$ and not correlated with $(v_{i3} - v_{i2})$ as long as the (v_{it}) are not serially correlated. But for $t=4$, the second period it is observed that from eq (2)

$$y_{i4} - y_{i3} = \alpha(y_{i3} - y_{i2}) + (v_{i4} - v_{i3}) \dots \dots \dots (B)$$

in this case, y_{i2} as well as y_{i1} are valid instruments for $(y_{i3} - y_{i2})$, since both y_{i2} and y_{i1} are not correlated with $(v_{i4} - v_{i3})$. One can continue in this fashion, adding an extra valid instrument with each forward period, so that for period T, the set of valid instruments becomes $(y_{i1}, y_{i2}, \dots, y_{iT-2})$. This instrumental variable procedure still does not account for the differenced error term in (2). In fact

$$E(\Delta v_i, \Delta v_i') = \Delta \delta_v^2 (I \otimes G) \dots \dots \dots (3)$$

Where

$$\Delta v_i' = (v_{i3} - v_{i2}, \dots, v_{iT} - v_{iT-1})$$

And

$$G = \begin{bmatrix} 2 & -1 & 0 & \dots & 0 & 0 & 0 \\ -1 & 2 & -1 & \dots & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ 0 & 0 & 0 & \dots & -1 & 2 & -1 \\ 0 & 0 & 0 & \dots & 0 & -1 & 2 \end{bmatrix}$$

is $(T-2) \times (T-2)$, since v_i is MA(1) with unit root. Define

$$W_i = \begin{pmatrix} y_{i1} & \dots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \dots & y_{i1}, y_{i2}, \dots, y_{iT-2} \end{pmatrix} \dots \dots \dots (4)$$

Then, the matrix of instruments is $W = (y_{i1}, y_{i1}, y_{i1} \dots \dots y_{i1})$ and the moment equations described above are given by $E(W_i' \Delta v_i) = 0$. These moment conditions have also been pointed out by Holtz-Eakin(1988), Holtz-Eakin, Newey and Rosen (1988) and Ahn and Schmidt(1995).

Pre multiplying the differenced equation (2) in vector form by W' ,

$$W' \Delta Y = W' (\Delta Y_{-1}) \delta + W' \Delta v \dots \dots \dots \quad (5)$$

Performing GLS on (5) the Arellano and Bond preliminary one-step consistent estimator is

$$\begin{aligned} \widehat{\delta}_1 = & [(\Delta y_{-1})' W (W' (I_N \otimes G) W)]^{-1} W' (\Delta y_{-1})^{-1} \\ & \times [(\Delta y_{-1})' W (W' (I_N \otimes G) W)]^{-1} W' (\Delta Y) \dots \dots \dots \quad (6) \end{aligned}$$

The optimal GMM estimator of δ_1 Hansen (1982) for $N \rightarrow \infty$ and T fixed using only the above moment restrictions yields the same expression as in (6) except that

$$w' (I_N \otimes G) W = \sum_{i=1}^N W' G W_i$$

is replaced by

$$V_N = \sum_{i=1}^N W' (\Delta v_i) (\Delta v_i)' W_i$$

This GMM estimator requires no knowledge concerning the initial conditions or the distributions of v_i and μ_i . To operationalize this estimator, Δv is replaced by differenced residuals obtained from the preliminary consistent estimator $\widehat{\delta}_1$. The resulting estimator is the two-step Arellano and Bond (1991) GMM estimator:

$$\widehat{\delta}_2 = [((\Delta y_{-1})' W V_N^{-1} W' (\Delta y_{-1}))^{-1} [((\Delta y_{-1})' W V_N^{-1} W' (\Delta y))] \dots \dots \dots \quad (7)$$

A consistent estimate of the asymptotic var ($\widehat{\delta}_2$) is given by the first term in (7)

$$\widehat{var}(\widehat{\delta}_2) = [((\Delta y_{-1})' W V_N^{-1} W' (\Delta y_{-1}))^{-1}]$$

Here now $\widehat{\delta}_1$ and $\widehat{\delta}_2$ are asymptotically equivalent if the v_{it} are IID $(0, \delta_v^2)$. And now to check the validity of instrumental variable J-test is to be used and its procedure is as follows:

3.6.4. J-Test:

J statistics also known as Sargan test or Hensen test is used to check the validity of the instrument used. In the case of more instruments than parameters, J statistics is used to test the validity of over identifying restrictions. J statistic follows chi-square distribution under the null that over identifying restrictions are satisfied.

If Z is an instrumental variable and if it is a valid instrument for x then the following must be true.

- The instrument must be exogenous that is

$$Cov(z, \varepsilon) = 0$$

- The instrument must be correlated with the endogenous explanatory variable X, that is

$$Cov(z, x) \neq 0$$

When the numbers of moment conditions are greater than the dimension of the parameter vector θ , the model is said to be over-identified. Over-identification allows us to check whether the model's moment conditions match the data well or not. Conceptually check whether $\widehat{m}(\theta)$ is sufficiently close to zero to suggest that the model fits the data well. The GMM method has then replaced the problem of solving the equation $\widehat{m}(\theta) = 0$, which chooses θ to match the restrictions exactly, by a minimization calculation. The minimization can always be conducted even when no θ_0 exists such that: $m(\theta_0) = 0$.

The J-test is also called a test for over-identifying restrictions under the following hypothesis.

Ho; $m(\theta_0) = 0$ the model is valid

Ha; $m(\theta_0) \neq 0$ that model is invalid and the data do not come close to meeting the

Restrictions

The standard method of testing over-identifying restrictions is to take the second step estimator $\hat{\theta}_T$ of the parameter θ , and construct a test statistics J_T :

$$J_T = T g_T(\hat{\theta}_T)' W_T^{-1}(\tilde{\theta}_T) g_T(\hat{\theta}_T) / q$$

The above definition is slightly different from the standard one in that the GMM objective function is normalized by the degree of over-identification. The normalization does not have any impact on the properties of the test as long as critical values are appropriately adjusted. In the following we also consider

$$\hat{J}_T = T g_T(\hat{\theta}_T)' W_T^{-1}(\hat{\theta}_T) g_T(\hat{\theta}_T) / q$$

That is, the test statistic with the updated weighting matrix The J statistic is distributed as χ^2 with degrees of freedom equal to the number of over identifying restrictions $L-K$ rather than the total number of moment conditions L because, in effect, K degrees of freedom are used up in estimating the coefficients of β . J is the most common diagnostic utilized in GMM estimation to evaluate the suitability of the model. A rejection of the null hypothesis implies that the instruments are not satisfying the orthogonality conditions required for their employment. This may be either because they are not truly exogenous, or because they are being incorrectly excluded from the regression.

3.6.5. Autoregressive Process (AR):

Generally an autoregressive (AR) process is used to test that whether the problem of serial correlation between the residuals has been removed by using instruments. Most of the studies have been used autoregressive process of order one and two for the solution of this problem.

Consider in the case of any variable X_t , it is represented as

$$(X_t - \delta) = \theta_1(X_{t-1} - \delta) + \mu_t$$

Here δ denotes the mean of X_t and μ_t specifies the error term with zero mean and constant variance. This equation represents the AR (1) process and explains that X_t depends upon its earlier value X_{t-1} and on a random factor.

The autoregressive of 2nd order process can be now defined as:

$$(X_t - \delta) = \theta_1(X_{t-1} - \delta) + \theta_2(X_{t-2} - \delta) + \mu_t$$

For the autoregressive process of kth order is described as under:

$$(X_t - \delta) = \theta_1(X_{t-1} - \delta) + \theta_2(X_{t-2} - \delta) + \dots + \theta_k(X_{t-k} - \delta) + \mu_t$$

In next chapter we first test the existence of unit root and the problem of multi-collinearity. Then GMM will be used for the estimation of required model and during the GMM technique validity of instruments must be required. So for this J statistics is recommended to check that how much the instruments are valid. In the next chapter, the complete results of all tests and model will be included.

Chapter 4

Empirical Results

This chapter discusses the empirical results and interpretation. The section 4.1 presents the results of unit root test, correlation matrix,

4.1. Panel Unit Root Test:

In this panel data analysis there may be the problem of unit root because of its nature so it is required to calculate the data for the detection of unit root before proceeding in further analysis. Generally for the detection of panel unit root, tests like Levin, Lin and Chu (LLC), Im, Pesaran and Shin (IPS), Fisher –ADF (Augmented Dickey Fuller), Fisher, Philip- Perron (PP) and Hadri are to be used. Every test can have the different results. For example Fisher–ADF, Fisher–Philip- Perron (PP) and Im, Pesaran and Shin (IPS) tests assume individual unit root for each cross sections and on the other hand Breitung, Hadri and Levin, Lin and Chu deal the panel unit root as homogenous across all cross sections.

In this study the results about the unit root of all the variables which are to be used are reported in Table.4.1. According to P-value of LLC and IPS tests for all the variables under discussion are free from unit root at first difference except inflation which is stationary at level. The results reported during estimation of unit root are as under.

Table: 4.1. Panel Unit Root

<i>Variables</i>	<i>LLC Test Stats</i>	<i>IPS Test Stats</i>	<i>Test for Unit Root</i>	<i>Conclusion</i>
<i>Log Aslt</i>	-7.87749	-5.92721	1 st Difference	Stationary
<i>Log Hom</i>	-2.74780	-7.68897	1 st Difference	Stationary
<i>Log Rob</i>	-6.53279	-5.74593	1 st Difference	Stationary
<i>Log Thft</i>	-8.23837	-6.86246	1 st Difference	Stationary
<i>Log Pop</i>	-9.51944	-3.33897	1 st Difference	Stationary
<i>Log GDP</i>	-7.54367	-4.87108	1 st Difference	Stationary
<i>UN</i>	-12.6153	-9.89270	1 st Difference	Stationary
<i>WR</i>	-10.2239	-5.58740	1 st Difference	Stationary
<i>INF</i>	-47.6918	-35.9536	Level	Stationary

Note:

- LLC represents the Levin, Lin & Chu, while IPS is Im, Pesaran & Shin panel unit root tests.
- LLC test assumes that there is common unit root process during the test whereas IPS assumes that there is individual unit root procedure with the null of unit root.
- Assault, Homicide, Robbery, Theft, Population, Gross Domestic Product, Unemployment, Wage Rate, Inflation and Labor Force Participation Rate are symbolized by the Aslt, Hom, Rob, Thft, Pop, GDP, UN, WR, Inf and LP respectively.

4.2. Correlation Matrix:

Multicollinearity is the problem which leads to the misleading results of any analysis so there is need to investigate it before analysis that the problem of high multi-collinearity does not exist in the explanatory variables. To detect the scale of correlation, correlation matrix method is commonly used in the previous studies. The below results specify that the variables under discussion haven't the problem of multicollinearity and all explanatory variables have expected signs. Table 4.2 expresses the results of all the explanatory variables of this study which are as under.

Table: 4.2 Correlation Matrix

<i>Variables</i>	<i>INF</i>	<i>LNPOP</i>	<i>LNGDP</i>	<i>UN</i>	<i>WR</i>
<i>INF</i>	1	0.083904	-0.09376	0.042586	-0.22842
<i>LNPOP</i>	0.0839	1	0.753229	-0.33835	-0.29009
<i>LNGDP</i>	-0.0938	0.753229	1	-0.52888	0.206924
<i>UN</i>	0.045286	-0.33835	-0.52888	1	-0.14593
<i>WR</i>	-0.22842	-0.29009	0.206924	-0.14593	1

4.3. Panel Data Regression Results:

The connection among criminal activities and macroeconomic variables remain ambiguous because according to the previous research related to economic performance and crime reports the different results theoretically as well as empirically. Now here in this section this study explores the socioeconomic and demographic determinants of crime in wider view. The model is first estimated by taking the crime as a whole in which all types of crimes⁹ are included and economic factors¹⁰ are taken as independents. In the next step for better investigation of the relationship, all reported crimes are classified into property¹¹ crime and violent¹² crime and then all types of crimes are also estimated individually with economic factors. In this study Generalized Method of Moments (GMM) is used for the estimation of model.

⁹ Burglary, Theft, Assaults and Homicide

¹⁰ Population, Gross domestic product, Unemployment, Inflation and Wage rate

¹¹ Burglary and Theft

¹² Assaults and Homicide

4.3.1. Total Crime:

Estimation results establish by this study are according to the findings of the literature and presents in the Table 4.3.

Table: 4.3 Results of Factors Effecting Total Crime

<i>Explanatory Variables</i>	<i>Coefficients</i>	<i>Standard Errors</i>
$\ln Tc_{it-1}$	0.25599	0.0640***
$\ln Gdp_{it}$	0.310395	0.29341*
$\ln Pop_{it}$	0.3021	0.159***
Un_{it}	-0.005005	0.0024**
Un_{it-1}	-0.006446	0.0030**
Un_{it-2}	0.004200	0.001943**
Wr_{it}	- 0.007515	0.00360**
Inf_{it}	0.004005	0.00146**
<i>Sargan Test (P-value)</i>	<i>0.3065</i>	
<i>M₂ Test statistics</i>	<i>0.46811</i>	

Note:

- Here One step GMM estimates
- Tc means the total crime, GDP is the gross domestic product, Un, wr and Inf represents the unemployment, wage rate and inflation respectively.
- The test for 2nd order serial correlation M2 followed by null hypothesis of no serial correlation which is based on residuals asymptotically distributed as $N(0,1)$.
- To check the validity of instruments, Sargan test is used under the null hypothesis of instruments are valid asymptotically distributed as Chi square distribution.
- Statistics significant at 1%, 5% and 10% is denoted by ***, ** and * respectively.

In the above estimated results the dynamics of the model is captured by the lag dependent variable. The first lag of dependent variable (crime) has positive impact at the 1% level of significance. This positive relation between the current numbers of crimes with previous year's crime rate indicates persistence in crime rate. It can be said that the current year criminal activities are significantly affected by the last year crime. Buonanno and Daniel (2005) also find similar results based on panel data analysis for the Spanish provinces from the year 1993 to 1999 that lag of crime rate is highly significant relation with the crime rate. This result is confirmed by earlier findings so it is important determinant of crime rate. Lag of dependent variable may

create problem of endogeneity GMM method technique is used because its instrumental estimating procedure deals with this problem.

The relationship between crime and GDP is positive which shows that with the increase in GDP increases overall crimes at 10% level of significance. Previous studies also suggest these types of results. In the empirical literature review show in detail that GDP can have positive effect as well as negative to different types of crime. The “increase in prosperity can be the outcome of increase in demand for banned services and goods. And due to this increase in demand both supply and high prices will increase, which can lead to extra viciousness and exploitation (UNODC)¹³.” Generally the perception is this, economy with comparatively high GDP should have the less crime because in case of higher GDP people will accommodate well both physically and mentally, so their intention to commit crime will be low. However, in many studies there is increase in crime with the increase in GDP. A research based on the Italian dataset by Detotto and Manuela (2010) found that there is positive relation between crime and GDP.

Numbers of crime are also affected by the population density. Theoretically it is known that the crime ratio is more in those regions having more population. More than half population of the world is living in Asian countries and here in this study the panel of fourteen countries is taken from the four regions of Asia¹⁴¹⁵ where a bulk of population is living. The analysis leads to a highly significant positive relationship between crime and population which shows that if the population is increased by 1% there is 0.3021% increase in crime.

¹³United Nations Office on Drug and Crime, 2009

¹⁴East, West, North and South

¹⁵Pakistan, Kyrgyzstan, Hong Kong, Japan, Magnolia, Korea, India, Armenia, Azerbaijan, Georgia, Cyprus, Turkey and Thailand, Tajikistan

Another financial issue which can affect crimes is unemployment. In this study for the case of total crime, both current and previous year unemployment has negative coefficients - 0.005005 and -0.00644 respectively and has significant relationship at 5% level of significance. This guide that with 1% increase in current and lagged one unemployment there is 0.0050 and 0.00644 decrease in crime. However this decrease in crime at small level but it is the inverse relationship between crime and this economic factor. This small inverse relationship between current and previous year unemployment and crime also might be due to the payment of some unemployment allowance offered by the government or possibly due to the high ethical values. There may be some assets or savings of the individual which can be used to fulfill their economic activities in their recession period.

Commonly it is thought that there is positive relationship between unemployment rate and crimes. It was examined in the history about the linkage between unemployment and crime but the supremacy of this association rests unclear for its nature, Buonannn and Montolio, (2005). The rate of unemployment also seems to be considerably negatively linked with crimes. This conclusion is not shocking meanwhile the strength of the link among rate of unemployment and crimes is confusing about its nature and robustness as well.¹⁶”The existing observed literature fails to clear the relationship between unemployment and crime.

While the current criminal activities are positively affected by the unemployment of two lagged having coefficient 0.004200 which is also significant at 5% level of significance. This shows that 1% increase in two years lagged unemployment causes increase in crime 0.0042% significantly. This type of effect may be due to the supervision effects increase as the business cycle because unemployed individuals generally find employment within one year and if that

¹⁶See Freeman (1999), Chiricos (1987) and Masciandaro (1999) for reference

individual unable to find any kind of job or financial security for the two years then that individual's attitude convert to some type of criminal activity. The positive effect of lagged two years unemployment leads to the conclusion that stress and anxiety of any individual who is jobless or don't have any source of income during two years forced to commit a blunder or some criminal activity. (Land and Cantor, 1985) claimed that rate of unemployment and crimes are negatively related as the jobless individuals had spent on property and luxuries less. Moreover, they choose to stay at home." As a result, they may have more security for their property and hence the crime incident will be less happened. In addition to that, Cantor and Land (1985; 2001) and Greenberg(2001) "express that the opportunity effect should be instant or short run phenomenon while the motivational effects are likely to be long run criminal effect because most workers have savings or some other benefits to consume at their needs for that time after when they loss their job.¹⁷

Wage rate is an important factor which must be involve in the criminal activities because low wage rate restricted an individual to consume freely. Expenses are boosting up with every passing day so if the wage rates will not increase accordingly then to survive well in the society, the individual step forward to commit crime. Here in this study wage rate is negatively associated with the crime having coefficient -0.007515 that means that 1% increase in wage rate results that there is 0.007515 decreases in total crime and the result is highly significant at 5% level of significance. The reported results are according to the previous studies on relationship between crime and wage rate. (Raphael and Ebmer: 2001) and Wilson (1996) reported that by decreasing wage rate chances that unskilled men contribute to the criminal activities. Meghir and Machin (2004) have concluded the calculated amount of rate unemployment is statistically

¹⁷see also Paternoster and Bushway,2001

insignificant. Unemployment rate is of slightly significance. But, the decline in the salaries of less income labors significantly increase crimes. By using U.S. panel data from 1984 to 1993 of different states, Doyle et al. (1999) have reported that wages impact crime. To control the unobserved heterogeneity across cross section they used fixed effects and concluded that there is high indication that when salaries in less trained sectors reduces then both property crimes and violent crimes are increased.

Inflation is another economic factor which reduces the capacity of a consumer to fulfill the needs as well as wishes and that situation leads the individual to frustration. So it might be the cause of committing the crime. That's why in the current study inflation rate is included as the explanatory variable to check either inflation become the reason of promoting criminal activities or not. So in this analysis it has come to know that inflation has positive relation with the crime having coefficient 0.004005. The study concluded that with 1% increase in inflation rate there is 0.004% increase in crime. The value of the coefficient is small but the relationship is significant at 5% level of significance. Therefore it can be easily said that increase in inflation reduces the purchasing power of individual and then less income people involve themselves in crime. These results are according to the theory and previous literature gave the evidence from the different analysis of different regions of the world. Tang & Lean examined the relationship between crimes and its factors in the U.S data from 1960 to 2005. The observed results show that inflation rate and crimes are co-integrated with a direct relationship. Chung (1993) has established a result that rate of inflation in United States was directly related with all types of crimes, violent crimes and property crimes. Long and Witte (1983) have argued that crimes are increased as rate of inflation increases because tough periods encourage illegal attitude.

After reporting and interpreting the all relationship between economic factors there is need to check that instruments used in the GMM estimation process are valid and also test the existence of second order serial correlation among the transformed residuals. For the validity of instruments here j-statistics is reported with null hypothesis that instruments are valid. And according to p-value by accepting the null hypothesis it is concluded that instruments are valid. For the existence of second order serial correlation between the residuals M_2 Test statistics are reported and results of this is according to requirement. Null hypothesis of no serial correlation is accepted and concluded that there is no problem of second order serial correlation between the residuals.

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4.3.2. Violent Crimes:

In the explanation of the above reported results about the relationship between total crime and macroeconomic variables, the results indicate that these economic factors have the strong impact at crime somewhere positive and somewhere negative. In case of total crime, all reported crimes¹⁸ are included. Now again by using GMM technique the analysis for property crime is to be done by including the same economic factors are taken as independents. Estimation results establish by this study are according to the findings of the literature and presents in the Table 4.4.

¹⁸Robbery, theft, Assaults and homicide

Table: 4.4. Results about the Violent Crime

<i>Explanatory Variables</i>	<i>Coefficients</i>	<i>Standard Errors</i>
$\ln Vc_{it-1}$	0.665474	0.047262***
$\ln Gdp_{it}$	-0.281159	0.1322**
$\ln Pop_{it}$	3.7141	1.544**
Un_{it}	-0.0083	0.0036**
Un_{it-1}	-0.00953	0.0042**
Un_{it-2}	0.0072	0.0030**
Wr_{it}	-0.000891	0.0064***
Inf_{it}	0.0022	0.0011**
<i>Sargan Test (P-value)</i>	0.345	
<i>M₂ Test statistics</i>	-1.287199	

Note:

- Here is also one step GMM estimates
- Pc means the property crime, GDP is the gross domestic product, Un , wr and Inf represents the unemployment, wage rate and inflation respectively.
- The test for 2nd order serial correlation M_2 followed by null hypothesis of no serial correlation and to check the validity of instruments, Sargan test is to be used under the null hypothesis of instruments are valid.
- Statistics significant at 1%, 5% and 10% is denoted by ***, ** and * respectively.

The dynamics panel model is estimated here to capture by the lag of dependent variable. The 1st lag of dependent variable is taken as the explanatory variable to check that is there any connection of current violent crime with the previous year crime. After analyzing there is found that current year violent crime have highly significant impact at the 1% level of significance from the last year violent crime. The positive sign of the coefficient 0.665474 specifies that there is a positive relation and on the behalf of this it can be said that the current year criminal activities are significantly affected of the last year violent crime or there is persistence in violent crime in the analysis.

In the above case it is known that GDP is positively associated with the total crime that means overall crime increases with the increase of GDP . Commonly the opinion is this, increase

in GDP should have the less crime and for the case of violent crime it is also according to this opinion. But in this section the coefficient of GDP is -0.281159 and negative sign leads to the negative relationship between the violent crimes. This shows that with 1% increase in GDP results the 0.2811% decrease in crime and it significant relationship at 5% level of significance. This result is according to the available literature and theoretical assessment. Altindag (2009) investigate that GDP has inverse relationship with violent crime significantly in the case of European countries. The result of this study about the violent crime is according to the pattern of general theory for example Becker. (1968); Freeman. (1999); Ehrlich. (1975); Levitt. (2004), The relationship among violent crime and GDP may also disclose that violent crimes affect GDP in case of long run, short-run and both as well. (Gavrilova et al., 2000) It is possible that as GDP reduces, psychological stress and social pressure increases resulting in the form of increased violence.

The population density also affects the crime rate, as theory suggests that the crime rate is more in those regions having more population. The result shows that the population coefficient is very large which is 3.714 against violent crime and guides that with 1% increase in population there will be 3.714% increase in violent crime and that increase in violent crime is significant at 5% level of significance. Asian countries are the high populated countries and here in this study it is concluded that increase in population results in increasing violent crime. It is because of this when population is going to increase then the limited resources and assets are further more divisible which leads to the chances of committing crime for an individual.

Unemployment rate has the same impact for the violent crime like the total crime which is that current and last year unemployment rate have negatively related to the violent crime. About the relationship between unemployment and crime commonly it is believed that if

unemployment increases then the probability of committing crime also increases. But here the contradictory results are obtained, which means that the violent crimes have not been increased with the increase of both current and previous year unemployment rate. About the linkage between unemployment and crime Montolio & Buonanno (2005) argued that the power of the relationship among unemployment and violent crime remains unclear in its nature. Previous studies show mix effect of unemployment at crime in both positive and negative ways for the different areas of the world. This study for the case of violent crime, both present and last year unemployment has negative coefficients -0.0083 and -0.00953 respectively and has significant connection at 5% level of significance. This means that with 1% increase in current unemployment rate there is 0.0083% decrease in crime and 0.00953% decrease in crime for those who are unemployed till one year. However the magnitudes of coefficients are small and the variations are at minor level but it is confirmed for this panel data analysis that the relationship between violent crime and this economic element is inversely related. This converse connection among unemployment and crime shows that someone is not agreed to commit violent crime like murder or attempted murder due to unemployment.

While the violent crime has positive impact due to the unemployment of two lagged having coefficient 0.0072 and significantly related at 5% level of significance. This shows that if any individual remain unemployed for two years then then that individual's approach transform to some type of criminal activity that cause the increase in violent crime to 0.0072% significantly. The conclusion can be drawn on the behalf of this positive effect of two years unemployment is that mentally tension due to being jobless and social pressure of any individual enforced to involve in a violent crime. Cantor and Land (1985; 2001) and Greenberg (2001) 's

finding also according to this study that the violent crime are negatively associated with unemployment.

Result reported about the wage rate and violent crimes is same as the total crime. In this research wage rate is inversely related with the violent crime having coefficient -0.00891 which concluded that if there is 1% increase in wage rate there is 0.00891% reductions in violent crime and the effect is very significant at 5% level of significance. The conclusion is according to the pattern of theory and past findings in this relationship between violent crime and wage rate. “The strongest proof that financial inducements are significant in defining the crimes, come from studies of individuals.¹⁹” Blumstein and Wallman (2006) and Levitt (2004) have concluded that the labor markets as a subgroup of many features that affect crimes and have strong relation with the violent crime. Doyle et al. (1999) also establish the result for U.S data that there is solid indication that when wage rate in low-skilled sectors decrease violent crime are increased.

When an individual is unable to attain his genuine desires and needs with limited resources then commonly his attention become divert to do some illegal activities. Inflation rate may be the source of creating such kind of situation which leads the individual to frustration. In this study it is already discussed that for the case of total crime, increasing of inflation rate causes the increase in crime rate. Now here in this study inflation has positive significant impact for the violent crime. The coefficient of inflation is 0.0022 which shows that due to 1% increase in inflation rate there is 0.002% increase in violent crime significantly at 5% level of significance. It is just because of that due to inflation all the goods become costly and these are far away from the range of an individual, so to achieve his desires someone become the part of any violence.

¹⁹Freeman (1995, p. 184)

Foon Tang & Lean (2007) found that that inflation and violent crimes are linked positively in the United States from 1960 to 2005.

Result of j-statistics suggests that valid instruments are selected by accepting the null hypothesis that instruments are valid according to p-value. And there is no evidence for the presence of second order serial correlation between the residuals because M_2 Test statistics results are according to condition. Conclusion is drawn on the basis of acceptance of null hypothesis of no serial correlation among the residuals.

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4.3.3. Property Crimes:

As discussed earlier that in total crimes, both property crimes and violent crimes have been included. Above determinants of total crime and violent crime are investigated, in this section the factors effecting property crime are estimated. Again GMM method is to be used for the estimation and results are presented in table 4.5 as under,

Table: 4.5 Results about the Property Crime

<i>Explanatory Variables</i>	<i>Coefficients</i>	<i>Standard Errors</i>
$\ln Pc_{it-1}$	0.341210	0.1000***
$\ln Gdp_{it}$	0.0787	0.040*
$\ln Pop_{it}$	0.0052	0.003*
Un_{it}	0.0054	0.0025**
Un_{it-1}	-0.0082	0.0023**
Un_{it-2}	-0.009515	0.0059*
Wr_{it}	-0.0021	0.0008**
Inf_{it}	0.00461	0.002**
<i>Sargan (p-value)</i>	0.09735	
<i>M₂-Test statistics</i>	-1.566425	

Note:

- One step GMM estimates
- Pc means the property crimes.
- The test for 2nd order serial correlation M2 followed by null hypothesis of no serial correlation.
- For the validity of instruments, Sargan test is to be used under the null hypothesis of instruments are valid. asymptotically distributed as Chi square distribution.
- Statistics significant at 1%, 5% and 10% is denoted by ***, ** and * respectively.

After the estimation of property crimes with economic, social and demographic factors, the interpretation of these results is now as under. As compared to total crimes and violent crimes, the property crimes are also significantly affected by the first lag of itself. So this lag dependent variable is taken as the explanatory variable. The property crimes of current year are highly affected by the previous year property crimes and have significant relationship at the 1% level of significance. The positive sign indicates persistence in property crime rate, that there is a

direct relation among the present year property crime and the previous year property among the present year property crime and the previous year property crime.

In the unit of property crime, GDP is again positively connected with the property crime that means property crime will be increased with the rise of GDP. Normally it is expected that increase in GDP will decrease crime but this relationship between these variables is quite confusing and literature also tells that in different circumstances increase in GDP results both increase and decrease in crimes. The result shows positive and significant relationship, with 1% increase in GDP there will be 0.0787% increase in property crime. This result is confirmed by other studies for example in report (UNODC, 2009), “Increase in GDP will increase prosperity can result in increased demand for illegal goods and services which may lead to more violence and corruption²⁰”

It is believed that more population utilized more resources, and with this situation the chances of crime is more. This study about property crimes also favors this conclusion that increase in population results in increasing property crimes. The result shows that with 1% increase in population there is 0.005% increase in property crimes that is significant at 10% level.

Unemployment rate has now the different impact for the property crimes as compared to the total crime and violent crime. The result indicates positive and significant relationship of the property crimes and unemployment rate. Simply it can be written as that if 1% increase in unemployment there will be 0.005% increase in property crime. Property crimes consist of robbery and theft, so this result suggests that may be when unemployment increases then people

²⁰United Nations Office on Drug and Crime

try to do any kind of robbery for the fulfillment of their desires. Rodriguez (2003) has found that relation among unemployment and property crimes is strong. Therefore, he concludes that there is a positive link between these variables. Haddad and Moghadam (2008) have examined during the study of factors of crime in Iran that there is need to increase the employment level for reducing the crime because unemployment has positive impact on crime. Unemployment lagged one year and lagged two years have the coefficients -0.0082 and -0.00951 respectively, which are statistically significantly at 5% level of significance. It concluded that there is negative relationship between these variables. These results indicate that previous two years unemployment will not be the reason of increase in crime and the coefficients have the small magnitude, which indicates there is little bit decrease in property crime due to the last two years unemployment. It can be said for these results about unemployment that current unemployment forced an individual to steal anything or to commit robbery or theft, this means that present unemployment will increase the crime significantly while the last two years unemployment have inverse relation with crime. It may be due to some savings or some assets which would be helpful in that time when an individual is unemployed.

The relationship between wage rate and property crimes is same as the total crime and violent crimes. In this unit wage rate is also conversely linked with the property crimes having coefficient -0.0021 which shows that there is 1% increase in wage rate causes 0.0021% decrease in property crime and the effect is significant at 5% level of significance but the existing change in property crimes is slight because the value of coefficient is so small. This result is as per expectations and according to the pattern of theory and past conclusions of the studies.

The increase in inflation makes an individual unable to attain his needs with limited resources then there are chances of his attention may divert to do some illegal activities. Inflation

rate increases the cost of living thus causing the individual to frustration. In this study it is already discussed that for the case of total crime, increasing of inflation rate causes the increase in crime rate. The result of this study inflation has positive significant impact for the violent crime. The coefficient of inflation is 0.0022 which shows that due to 1% increase in inflation rate there is 0.002% increase in violent crime significantly at 5% level of significance. It is just because of that due to inflation all the goods become costly and these are far away from the range of an individual, so to achieve his desires someone become the part of any violence. These results are accordingly the pattern of theory and previous literature like that Messwyr et al. (2001), Tang and Lean (2007), Teles (2004) and Ralston (1999). They find that rate of inflation decreases the purchasing power and increased the charge of living. Therefore the property crimes are boost up for the better living standards or at least to maintain the cost of living.

Finally it can be said that these economic factors play an important role for the property crime. These crimes are highly associated with inflation, wage rate, unemployment and population. To find out the results between the relationship of property crime and economic elements GMM method is to be used and during this process the instruments are selected, so there is need that either the selected instruments are valid or not. For this purpose j-statistics guided about the validity of instruments under the null hypothesis that instruments are valid. According to p-value result of j-stat lies in the acceptance region and on this behalf the study concluded that the instruments are valid. Here also in the process it is also necessary to check the existence of serial correlation. M_2 Test statistics results are according to condition and there is no evidence for the occurrence of second order serial correlation between the residuals and conclusion is drawn on the base of acceptance of null hypothesis of no serial correlation between the residuals.

4.3.4. All Types of Crime Individually:

In this study, Total number of crime, Violent and Property crime are to be discussed earlier for the case of fourteen countries panel by using GMM method taken as the dependent variable with economic factors as explanatory variables. Now the results of those crimes which are included in violent crimes and property crimes separately are examined for factors that cause these crimes and results are reported in table 4.6.

Table: 4.6. Results about All types of Crimes

Theft		Robbery		Assaults		Homicide	
Explanatory Variables	Coefficients	Explanatory Variables	Coefficients	Explanatory Variables	Coefficients	Explanatory Variables	Coefficients
$lnthf_{it-1}$	0.7797 0.0900***	$lnRob_{it-1}$	0.65827 (0.132)***	$lnAslt_{it-1}$	0.4567 (0.140)***	$lnhom_{it-1}$	0.4719 (0.056)***
$lnthf_{it-2}$	-0.1985 (0.065)***	$lnRob_{it-2}$	-0.22621 (0.053)***
$lnGdp_{it}$	0.119973 (0.1325)	$lnGdp_{it}$	0.686862 (0.199)***	$lnGdp_{it}$	-0.00835 (0.0039)**	$lnGdp_{it}$	-0.0280 (0.0095)**
$lnPop_{it}$	1.4495 (1.002)*	$lnPop_{it}$	1.175784 (0.69)*	$lnPop_{it}$	4.4955 (2.3620)*	$lnPop_{it}$	1.6609 (0.7293)**
Un_{it}	0.06162 (0.004)***	Un_{it}	0.0013 (0.005)***	Un_{it}	-0.0094 (0.0050)*	Un_{it}	-0.0064 (0.0031)**
Un_{it-1}	-0.0067 (0.0039)*	Un_{it-1}	-0.0069 (0.0038)*	Un_{it-1}	-0.0035 (0.0019)*	Un_{it-1}	-0.0071 (0.0033)**
Un_{it-2}	-0.0039 (0.0050)	Un_{it-2}	-0.0056 (0.003)*	Un_{it-2}	0.0047 (0.0031)	Un_{it-2}	0.0070 (0.001)***
Wr_{it}	-0.0932 0.004***	Wr_{it}	-0.026 (0.001)***	Wr_{it}	-0.047 0.006***	Wr_{it}	-0.0132 (.0007)***
Inf_{it}	0.00185 (0.0008)**	Inf_{it}	0.00329 (0.0013)**	Inf_{it}	0.0062 (0.002)***	Inf_{it}	0.0040 (0.001)***
<i>Sarg Test (P-value)</i>	0.2636	<i>Sarg Test (P-value)</i>	0.7098	<i>Sarg Test (P-value)</i>	0.26028	<i>Sarg Test (P-value)</i>	0.3666
<i>M₂-Test statistics</i>	-2.750		0.8000		-0.6449		-0.6499

Note:

- Here for each dependent variable One step GMM estimates
- *Thf, Rob, Aslt and Hom* represent Theft, Robbery, Homicide and Assaults respectively, *GDP* is the gross domestic product, *Un, wr and Inf* represents the unemployment, wage rate and inflation respectively.
- Standard errors are under the coefficients and in parenthesis.

- *2nd order serial correlation is tested by M2-test statistics under the null hypothesis of no serial correlation which is based on residuals asymptotically distributed as $N(0,1)$.*
- *Sargantest is to check the validity of instruments under the null hypothesis of instruments are valid asymptotically distributed as Chi square distribution.*
- *Statistics significant at 1%, 5% and 10% is denoted by ***, ** and * respectively.*

Before proceeding to the interpretation it should come to know that property crimes are the sum of robbery and theft while assaults and homicide are included in violent crimes. All these four crimes²¹ are significantly related to their first lag positively and the coefficients are 0.7797, 0.6582, 0.4567 and 0.4719 respectively. These results support that all these crimes are affected by their previous year crime rate and has inertia in the relationship. Theft is 0.7797%, robbery is 0.6582%, assaults is 0.4567% and homicide is 0.4719% increased due to the previous year crimes and all these relations are highly significant at 1% level of significant. These results are same as in the case of property crimes and violent crimes. In the case of theft and robbery there is second lag also involves having the coefficients -0.1985 and -0.2262 which shows that theft and robbery have inverse relation with the two years previous crimes and this relationship is highly significant at 1% level of significance. This may be due to the better governess, improving law and order situation or some development in financial issues which restricted an individual to commit crime and in the case of assaults and homicide there is no impact of the second lag which means that the homicide and assaults are not affected by the two years previous crimes significantly.

About the GDP, it is again controversial results against the all types of crime. As it is discussed earlier GDP is associated positively with the property and total crimes and for the violent crimes there is negative relationship of GDP and all these above results are according to

²¹Theft, Robbery, Assaults and Homicide

theory and empirical findings about this relationship. Here now when proceed the analysis the results show that those crimes which are involved in property crimes have the positive relation and those which are included in violent crime have negative relationship. The coefficients of GDP against theft, robbery, assaults and homicide are 0.00119, 0.6868, -0.00835 and -0.0280 respectively and these values are highly significant for robbery, assaults and homicide at 1%, 5% and 5% level of significance correspondingly while in case of theft the relationship is insignificant. It shows that with 1% increase in GDP there will be 0.0011% and 0.6868% increase in theft and robbery. So it is very easy to conclude that theft, robbery and property crimes are increased, if the GDP is increased while assaults and homicide will be decline due to the improvement in GDP. Empirically there is 0.008% and 0.028% decrease in assaults and homicide significantly with 1% increase in GDP respectively and same type of conclusion has come to seen in the case of violent crimes. Zimring (2006) argues that the growing economy of the 1990s sustained consumer's self-confidence and possibly is the most significant factor in decreasing various type of crime²².

In the above analysis it is crystal clear that population is the burning issue about crime for this Asian region because due to increase in population, crime rate for both property and violent crimes is going very high and this thing is now confirmed when the crimes of all type are individually analyzed. The coefficients of theft, robbery, assaults and homicides are 1.4495, 1.1757, 4.4955 and 1.6609 which indicates that with 1% increase in population, all types of crimes are increased by more than one percent and this increase in crime is highly significant. These outcomes of the analysis has shown earlier in prior literature for example about the single crime. Sampson (1983) has examined, and a positive relationship is to be found between

²² The great American crime decline

population density and rates of robbery and assaultive harassment. Myers (1983) and Grogger (1998) also report the consistent results with economic theory on the effect of economic features on property crimes.

Here again the interesting and matching results has come into seen that has already shown in the case of violent and property crime. For theft and robbery there exists a positive relationship with the current year unemployment and negative for the assaults and homicide which leads to the conclusion that if the individuals are more unemployed in present time then their attention is divert to commit theft or robbery but they never become the part of murder or any other serious crime. So it can be said that if 1% increase in current year unemployment then theft and robbery will increase 0.06162% and 0.0013% respectively while assaults and homicide will decrease 0.0094 and 0.0064%. The relationship is highly significant for theft and robbery at 1% level of significance while in case of assaults and homicide it is significant at 10% and 5% level of significance. Almin, (2011) also investigate the association of different types of crime with unemployment by using panel data of Sweden. The results show that there is positive effect of total unemployment on robbery and property crimes. Furthermore, Bernner (1984) and Bernner and Swank (1986) have specified that unemployment has a clear effect on the rates of homicide as well as the types of criminal activities. For the case of lagged two years unemployment the relationship is totally different because if any individual remain unemployed for the two years then results suggest that serious crimes like assaults and homicides increase while theft and robbery have negative impact. The relationship among homicide and lagged two years unemployment is significant at 1% level of significance while robbery is at 10% as well. Finally it can be said that unemployment of current and previous years is ever involved in criminal activities of some type. Unemployment is partially linked to the industrial sector, which

extremely disturbs the urban poor and, as a result, they have been associated to crime rates of all types (Wilson 1987, 1996).

As the relationship of wage rate with crime from all above discussion recommend that less wages motivate any individual to include himself in any kind of criminal activity. The results of all types of crime indicate that there is inverse relationship with wage rate which is significant at 1% level of significance. If wage rates are 1% decreased then there would be increase in theft, robbery, assaults and homicides 0.093%, 0.026%, 0.047% and 0.01% respectively. These results are same as required and confirmed the previous studies for example Wilson; (1986) & (1996), indicate that decreasing employment in the industrial sector shrinks the labor market options between urban male youth, so there is high probability of committing crime. Nunley, Richard Alan, Joachim; (2011) also mentioned that decreasing employment market choices for the fresh males may be important issue in committing property crimes, like robbery theft and kidnapping etc. Another research is made by Frenandez, Holman et al, (2011), which investigated the effect of wage rates on crime rate by using panel data from 1990 to 2002 in United States, the results indicate that all types of crime are positively affected by wage rates.

Limited resources is another great subject in all parts of the world and for the fulfillment of basic needs, these resources are out of range then crimes will must be increased. Inflation is one cause of this situation and this study also point out that it is directly related to all types of crime. The results show that crimes of all types are increased due to increase in inflation rate. The coefficients of theft, robbery, assaults and homicide are 0.00185, 0.00329, 0.0062 and 0.004 and in case of theft and robbery these are significant at 5% while for remaining at 1% level of significance. Tang and Lean (2009) find that unemployment has little effect on crime and

inflation has strong positive effect rather than unemployment on crime. Finally it can be said that the above discussed economic factors play a vital role for all types of crime.

To get the reliable results in GMM method, selection of valid instruments is a big deal. J-statistics leads to check the validity of instruments under the null hypothesis that instruments are valid. According to Sargan p-value results of j-stat in all the cases lie in the acceptance region and so it can be concluded that the instruments are valid. M_2 Test statistics guides that there is no problem of second order serial correlation between the residuals by accepting the null hypothesis of no serial correlation between the residuals.

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Chapter 5

Conclusion and Policy Recommendation:

5.1. Conclusion:

This study evaluated how macroeconomic environment play its role with property, violent and total number of crimes over time across countries. This empirical investigation is conducted for the set of fourteen countries taken from the four regions, East, West, North and South of Asia. Annual dataset is used for estimation with GMM method from 1995 to 2010. Well known socio-economic and demographic variables are considered for analysis. Total number of crimes then Property crimes, violent crimes and all four types crimes individually are investigated to obtain the reliable results.

This study finds that the inflation rate, population density, wage-rate and last year crimes have the most significant influence on the increase in property crimes, violent crimes, all types of crimes individually and the total number of crimes whereas GDP, current unemployment, lagged one and lagged two years unemployment rate have also significant impact on the crime rate but the behavior of these variables are different for different crimes. Property crimes have positive relation with GDP and current year unemployment while violent crimes are inversely related to the lagged one year unemployment and both these. On the other hand violent crimes have a direct relationship with lagged two years unemployment while property crime is negatively affected by this.

5.2. Policy Recommendation:

On the behalf of the above findings, the following recommendations are submitted by this study to avoid and reduce crimes about the economic point of view, are as under.

- About GDP, it looks necessary that the intention is not only to maximize the growth but it should be spent in a country for the betterment of law and order structure, welfare benefits and for the promotion ethical value. Another very necessary task that there may be the equal distribution of wealth because inequality causes many issues to destabilize the society.
- Population should be under control and there is need to highlight the awareness in people how can they make their children beneficial for the society.
- Unemployment rate can be decline by spending GDP in right way in industry and creating the job opportunities for the skilled and educated adults. Unemployment allowance should be started.
- Inflation decreases the purchasing power and due to low wage rate people are unable to fulfill their needs. So priority should be control at the inflation or at least increase the wage rates accordingly.

5.3. Limitation of the Study:

Due to limited data availability only 14 countries are include in the sample. These other economic factors like education, income inequality, religion, youth and urbanization, which should be included for better judgment and due to the limitations of data this study become unable to focus these variables.

5.4. *Future Extension:*

A cross region analysis can be done to investigate the determinants of crime. The study can be extended by examining the impact of crime on other economic variables like growth rate, education, income inequality, religion, youth and urbanization.

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