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Crime, Crisis and Economic Growth: An Investigation of Socio-Economic Determinants of Crimes in the Indian States

Ankita Thapa
Eastern Illinois University

CRIME, CRISIS AND ECONOMIC GROWTH: AN INVESTIGATION OF SOCIO-ECONOMIC DETERMINANTS OF CRIMES IN THE INDIAN STATES

By

Ankita Thapa

Eastern Illinois University

Department of Economics

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Thesis Committee

Dr. Ahmed Abou-Zaid (Supervisor)

Dr. Ali R. Moshtagh

Dr. Linda S. Ghent

ABSTRACT

This paper investigates the impact of socio-economic conditions on five major crime heads from 2001-2019 using a panel data set for the Indian states. The paper focus on the great recession of 2008-09, economic growth of the states, and deterrence variables. The paper employed two estimation procedures: panel Fixed-Effect and two-stage least square-fixed effect (2SLS-FE). The 2SLS-FE is preferred over the fixed effect method, where poverty is treated as an endogenous variable with higher education and social sector expenditure as instrumental variables. A dummy variable is used for the period of the great recession. A square of state GDP per capita is used to find evidence of a non-linear relationship between crime and economic growth. Three deterrence variables, namely conviction, arrest, and police strength are used in the model.

The study found that the great recession positively impacted total crime, violent crime, and crime against women. The economic growth (State's GDPs) positively affects total crime, economic offenses, and crime against women. The study also found evidence of an inverted U-shaped curve (non-linear relationship) between three crime categories and economic growth. The deterrence variables do not seem to have a deterrence effect on crime in the Indian states. However, their coefficients are highly significant but positive. Poverty and unemployment only seem to impact total crime out of all major crime categories.

Keywords: Crime, Recession, Economic growth, deterrence, 2SLS-FE, Endogeneity

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CHAPTER ONE

1. INTRODUCTION

There is not a single country in the world that is not affected by the evils of crime. Still, some countries face more detrimental consequences than others. Although the level of development is beginning to lay less and less influence on curbing crime in today's world, there is still a consensus that developed countries encounter few crime incidents (especially amongst the developing countries). Nevertheless, one cannot deny that easy access to weapons, illegal drugs, and advanced technology has made it easier for criminals to commit crimes nowadays. Crimes are as rampant in a developed country as in a developing economy. However, the former has more resources to constrain illegal activities and apprehend criminals.

India is a developing country of 1.3 Billion people with soaring crime rates. In past years various crimes, especially crimes against women, skyrocketed. Despite having one of the highest GDP growth rates, India lags in deterring criminal activities, which can be traced back to a lack of accountability and corruption in the Indian policing system.

In 2019, India registered 3,225,701 for IPC crimes and 1,930,471 SLL crimes. Crimes increased by 1.6 percent from the previous year, with 32.6 percent of the total IPC crime accounted for crime against body. Crime against women increased by 7.3 percent, and property crime increased by 6.5 percent in 2018 (National Crime Records Bureau, n.d.). The annual GDP growth of India in 2019 was 4.04, the unemployment rate was 5.27 percent, and the poverty rate was 6.7 percent (World Bank Open Data | Data, n.d.).

The crime and socio-economic statistics differ inside the states of India. Goa has the highest GDP per capita ($7,032), and Bihar has the lowest ($2,395) (Knoema.Com, n.d.). In terms of total

crimes, Uttar Pradesh (12.2% of total national crime), Maharashtra, and Kerala are the top three states. Assam recorded the highest rate of violent crime, 86.4 per 100,000. Madhya Pradesh recorded the highest rape cases, 16.3 percent of total rape cases in India (Times now, n.d.). Nagaland has the least crime rate recorded at 51.8 incidents per 100,000 compared to the national average of 241.2. It is also one of the safest states for women, with only 0.8 incidents of rape per 100,000 (Deka et al., n.d.).

However, it is difficult to ascertain the impact on crime during the recession. During the great recession, some countries experienced high crimes while in some it declined. The great recession of 2008-09 impacted India's trade by dropping exports to 16 percent. The Indian government then introduced three stimulus packages between December 2008 to February 2009, equivalent to US$ 245 Billion (3.5 % of GDP). The GDP dropped to 6.7 percent in 2008, then recovered soon to 8.5 percent in 2009-10 ("2008 Global Financial Crisis," Iyer). However, criminal activities did show an uptick. The IPC crime rose by 5.2 percent, crime against body increased by 4.8 percent, crime against property increased by 8.8 percent, and economic crime rose by 3.6 percent compared to the previous year. Crime against women, which includes molestation (4.3%), cruelty by husband (7.1%), sexual harassment (11.5%), and trafficking (9.8%), increased in 2008[1].

India would seem uniform to the outside world, but the enormous cultural, social and geographical disparity makes it unique. Therefore, the choice of incorporating a panel data analysis is appropriate, as proved by the statistics mentioned before. The socio-economic scenario and crime rates differ amongst the states, and hence the union and states' government work accordingly to manage their respective states.

[1] See appendix for total IPC crime map of India

1.2 Research Questions

The paper seeks to analyze the impact of socio-economic conditions and factors on significant crime categories: total crime, violent crime, property crime, economic offenses, and crime against women. It also seeks to determine the deterrence effect of deterrence variables that is arrest, conviction, and police strength on crime.

The research questions are as follows:

1. Does the Great Recession of 2008-09 influence the five given crime categories for Indian states?
2. Does the states' economic growth have any impact on all crime categories? Do they exhibit a non-linear relationship?
3. Are the deterrence variables able to deter crimes in Indian states?

1.3 Significance of the study

The motivation behind this study arises from the lack of research on the effect of economic growth, great recession, deterrence on crime rates, with a particular focus on Indian states. Most of the past research focused on the effect of crime on economic growth, not the other way around. The idea of exploring the non-linear relationship between economic growth and crime does stem from a research paper written by Nayebyazdi (2017). He incorporated the Kuznets curve propelled by Simon Kuznets in his paper. However, there is a deficiency of papers analyzing the non-linear relationship between economic growth and crime. Therefore, this paper is the first such attempt about India.

Moreover, several previous studies are at the national level. This study will explore the crime and other factors at the state level and can deliver much detailed information.

Although the great recession period is significantly studied, the main focus was on financial markets, monetary policies, and international trade. The literature has a dearth of studies on recession and its impact on crime, specifically in the Indian subcontinent. This study will equip the existing literature with empiric-based estimations on the relationship between recession and crime.

1.4 Organization of the study

The rest of the study is divided into six chapters. Chapter two elaborates on the crime trends in India and Indian states. Chapter three presents a literature review of previous theoretical and empirical studies and research. Chapter four describes the empirical strategy followed in the study, along with some preliminary tests and their results. Chapter Five will elaborate on the summary statistics and discuss the results from the two estimation techniques applied in the study. Finally, Chapter six concludes the study with summary, limitations, and future recommendations.

CHAPTER TWO

2. CRIME IN INDIA

2.1 The Legal System

The Indian Criminal procedure Code (CrPC) provides a complete punishment procedure under the penal laws. It enforces and administers the Indian Penal Code (IPC) and other criminal laws.

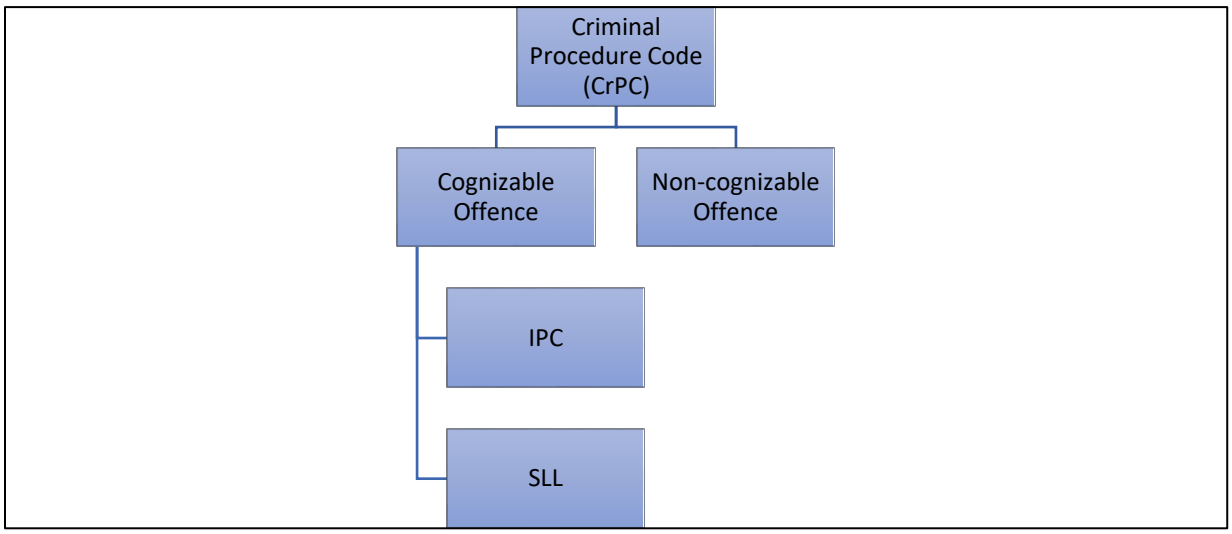
In the Indian Criminal Procedure Code (CrPC), there are two categories under which different crimes are recorded. One is a cognizable offense, and another is a non-cognizable offense. The police have to take prompt action when a complaint is filed under a cognizable crime. They have to visit the crime scene, gather evidence and information, apprehend the criminal and produce the offender before the court of law. All of this takes place without a court-mandated warrant. It includes crimes like murder, rape, theft, etc.

Under a non-cognizable offense, the courts summons the offender and, if needed, involve police investigation with the permission granted by the magistrate. It often includes less severe crimes. Under the cognizable offense, there are two sub-categories of law: the Indian Penal code (IPC) and the Special and Local Law (SLL) under which crimes are registered. The IPC is the official criminal code (a document) intended to cover all aspects of criminal law and breach of law. It consists of 23 chapters, 511 sections and covers a wide range of offenses with prescribed penalties and the punishments for the respective crimes (Code of Criminal Procedure, 1973, 1974). For example, sections 378 to 468 covers offenses against property.

Under SLL, crimes that violate unique acts or laws framed by parliament, and state or local government are registered. It covers specific acts and regulations like indecent representation of women, transplantation of human organs, lottery prohibition, sale of liquor, etc. The SLL crime

data are not included in this study as the legal procedure followed under such crimes is different from that of IPC crimes.

Figure 1: Criminal procedure code categories and sub-categories



Source: Author's Construction

The National Crime Records Bureau (NCRB) has maintained the crime database annually since 1986. It is an open database created to provide law enforcement agencies and the general public with information. The data is available at the national, state, district, and metropolitan levels (National Crime Records Bureau, n.d.).

In the executive summary by NCRB, there are six broad classifications of crimes under the Indian Penal Code (IPC). These are:

1. Crimes against body: It includes murder, attempted murder, culpable homicide, kidnapping & abduction, hurt, causing death by negligence.
2. Crimes against property: It includes dacoity, its preparation & assembly, robbery and burglary, and theft.
3. Crimes against public order: It includes riots and arson.
4. Economic crimes: it includes criminal breach of trust, cheating, and counterfeiting.

5. Crimes against women: It includes rape, dowry death, cruelty by husband and relatives, molestation, sexual harassment, and importation of girls.
6. Crimes against children: It includes rape, kidnapping, and abduction of children, procuration of minor girls, selling and buying of girls for prostitution, abetment of suicide, exposure and abandonment, infanticide, and foeticide (NCRB, executive summary, n.d.).

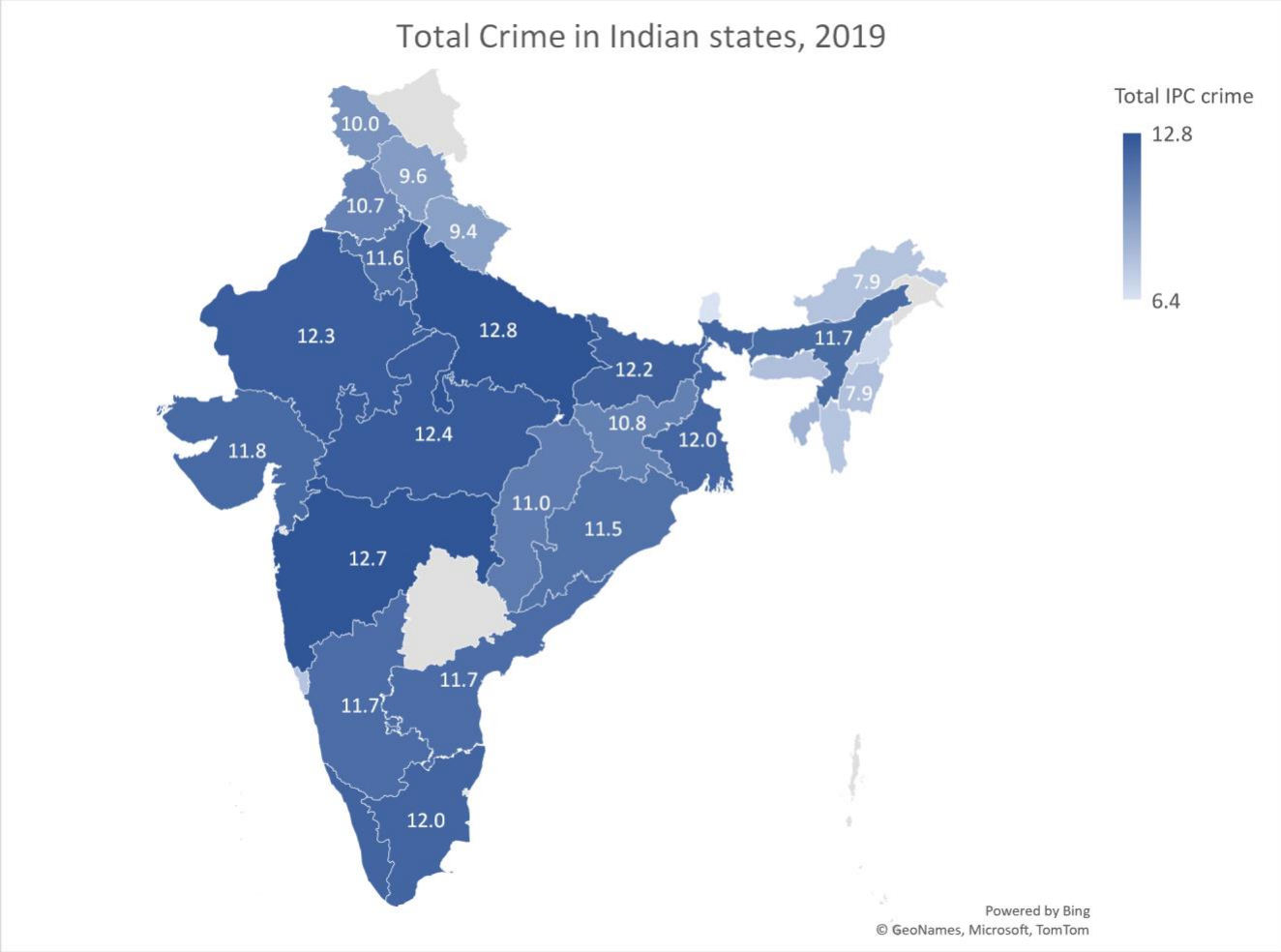
2.2 Crime in Indian States

In 2019, the NCRB recorded a rise in overall crime by 3 percent. Crime against women rose by 7.3 percent, economic offenses by 6.1 percent and, property crime by 6.5 percent in the same year. However, a rise in criminals' arrest and conviction rates by police and courts are also observed (CII 2019 states NCRB, n.d.).

As of now, India has 28 states and eight union territories. In October 2019, Jammu and Kashmir was reorganized into two union territories: Jammu & Kashmir and Ladakh. The difference between a state and a union territory is that the former has its own government while the Union government of India governs the latter as a federal territory. But this paper includes Jammu and Kashmir as a state because the crime data before 2019 recognize it as a state. Only Delhi is added to the study because it experiences high crime rates like any other state and serves as the national capital of the country.

Similarly, Telangana, formed in 2014, is not included in the study as the data is insufficient. I did not add any other union territories of India because the data are not chronologically maintained, and the crime rates are negligible compared to all the states.

Figure 2: Total crime growth in the Indian States



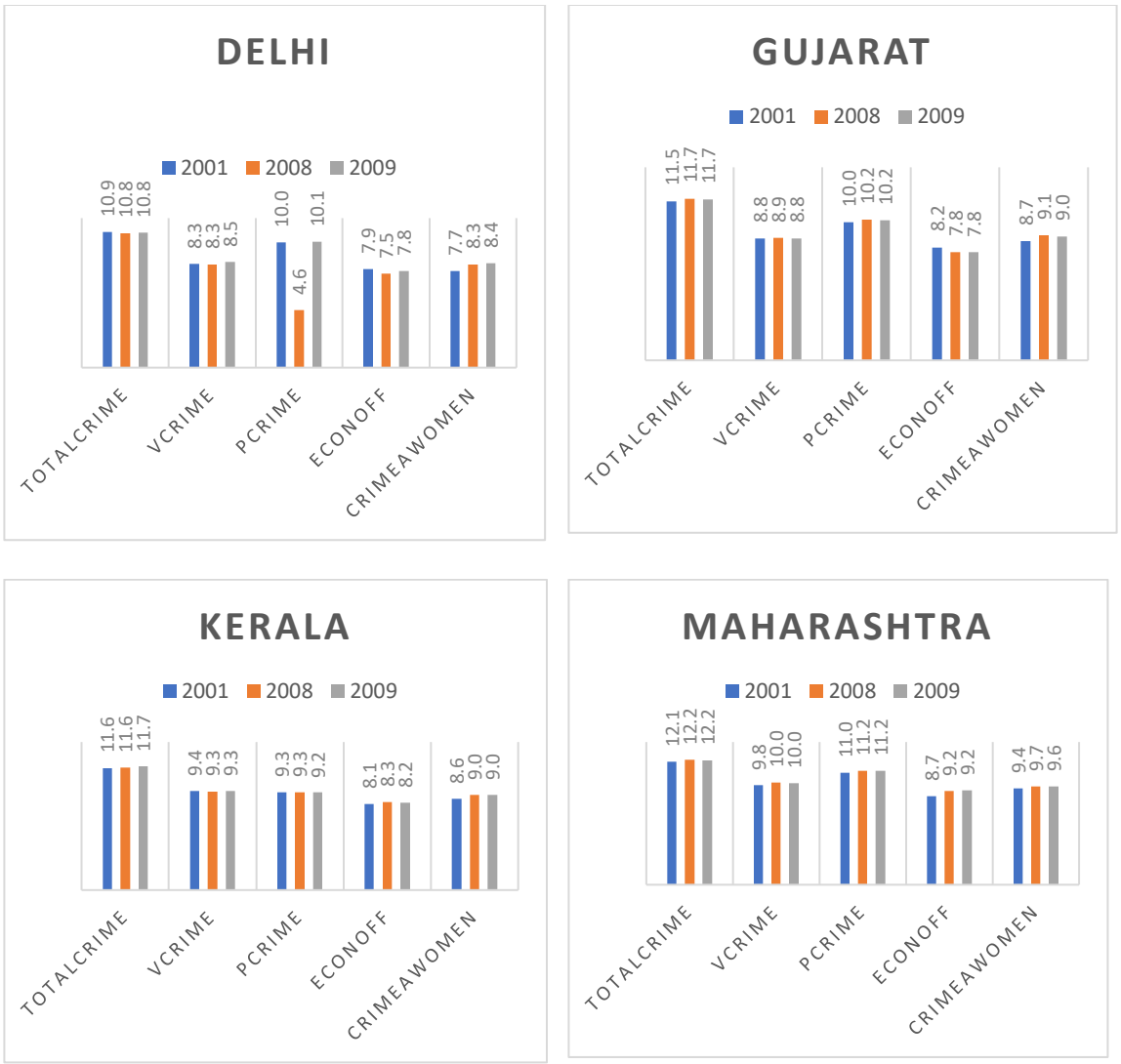
Data Source: NCRB; Figure: Author's Construction

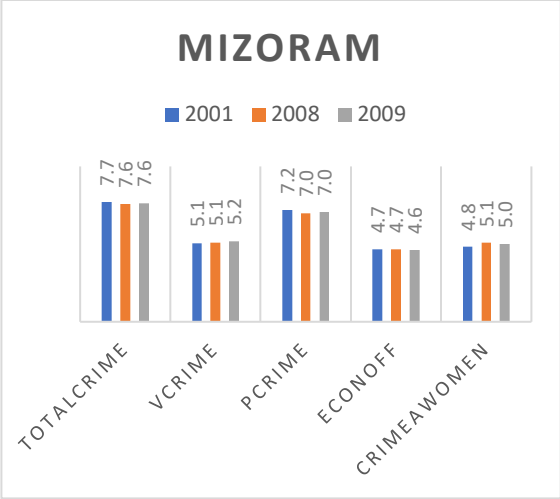
Figure 2 provides the total crime growth rates in Indian states in 2019 from 2018. Uttar Pradesh recorded the highest total crime growth rate of 12.8 percent. Similarly, many states like Madhya Pradesh, Maharashtra, and Rajasthan experienced a rise in total crime by more than 12 percent in 2019. We can also ascertain that crime is higher in bigger states from the map. North-Eastern states have less crime growth rate than all other Indian states, but the crime rate rose from the previous year in these states, too, except Sikkim. For example, in 2018, Nagaland recorded 6.9 percent growth in total crime in 2018 and 7.1 percent in 2019. In Delhi, actual crime rises by 12.6 percent in 2019, approximately equivalent to crime rates in the big states mentioned above.

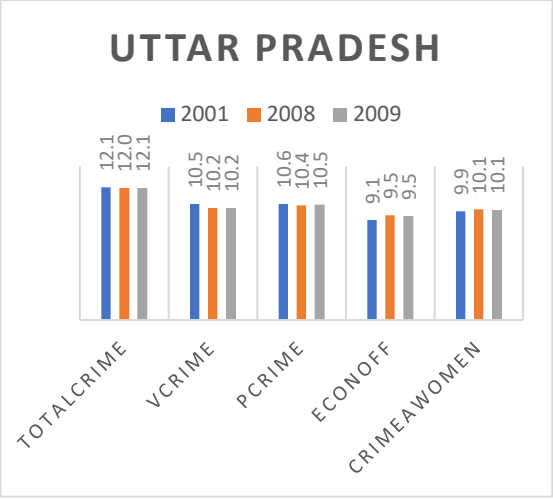
2.3 Crime and Recession

Figure 3 provides the comparative analysis of five states and one union territory from different zones for 2001, 2008, and 2009, representing the period before and after the Great Recession.

Figure 3: Crime Growth Rates in selected States







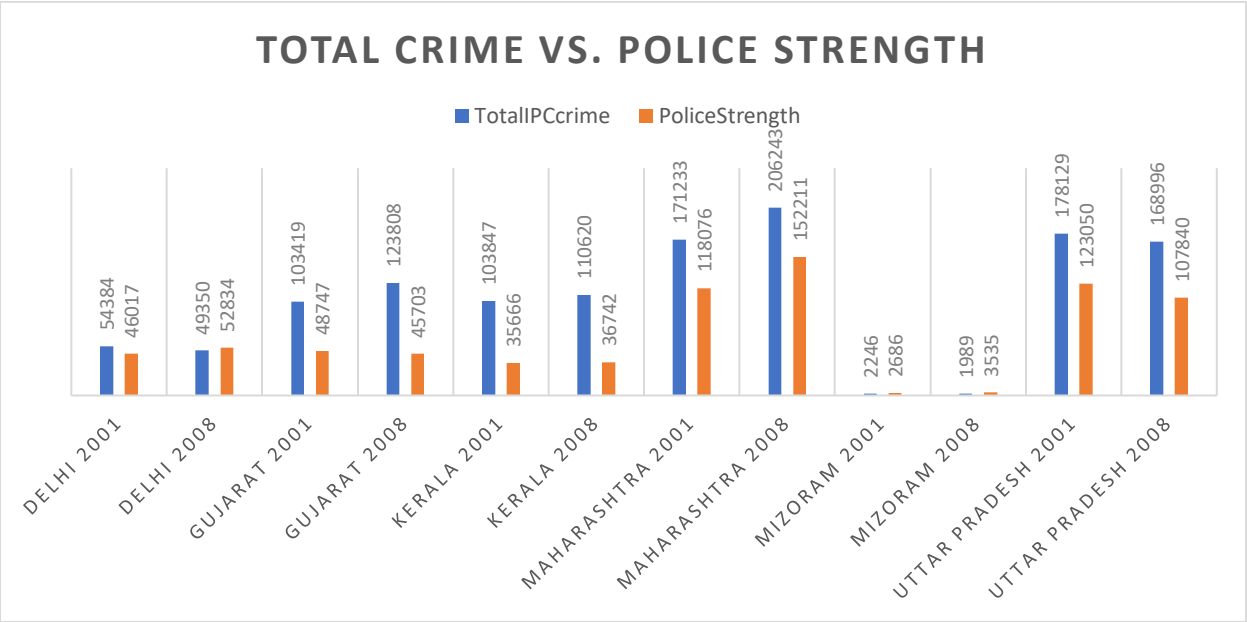
Source: NCRB; Graph: Author's construction

The different graphs of the states given here help to visualize the growth in various crime heads in pre-and post-crisis years. In Delhi, the growth in total crime rate was consistent in pre-and post-crisis years. Nevertheless, when we look at the crime heads separately, all categories showed a spike in crime growth rates. Property crime fell in 2008 compared to 2001, but it rose sharply in 2009. There was not much difference in the total crime rate of these states, but crime against women had grown in the post-crisis period.

Uttar Pradesh and Maharashtra saw a rise in economic crimes during the Great Recession. The rise in economic offenses post-recession was expected; however, it declined in Kerala, Mizoram, and Gujarat. Mizoram experienced less growth in crime as compared to the other states because it is a small state situated in the North-East of India.

2.4 Crime and Police strength

Figure 4: Total Crime vs. Police Strength in selected states (2001 and 2008)



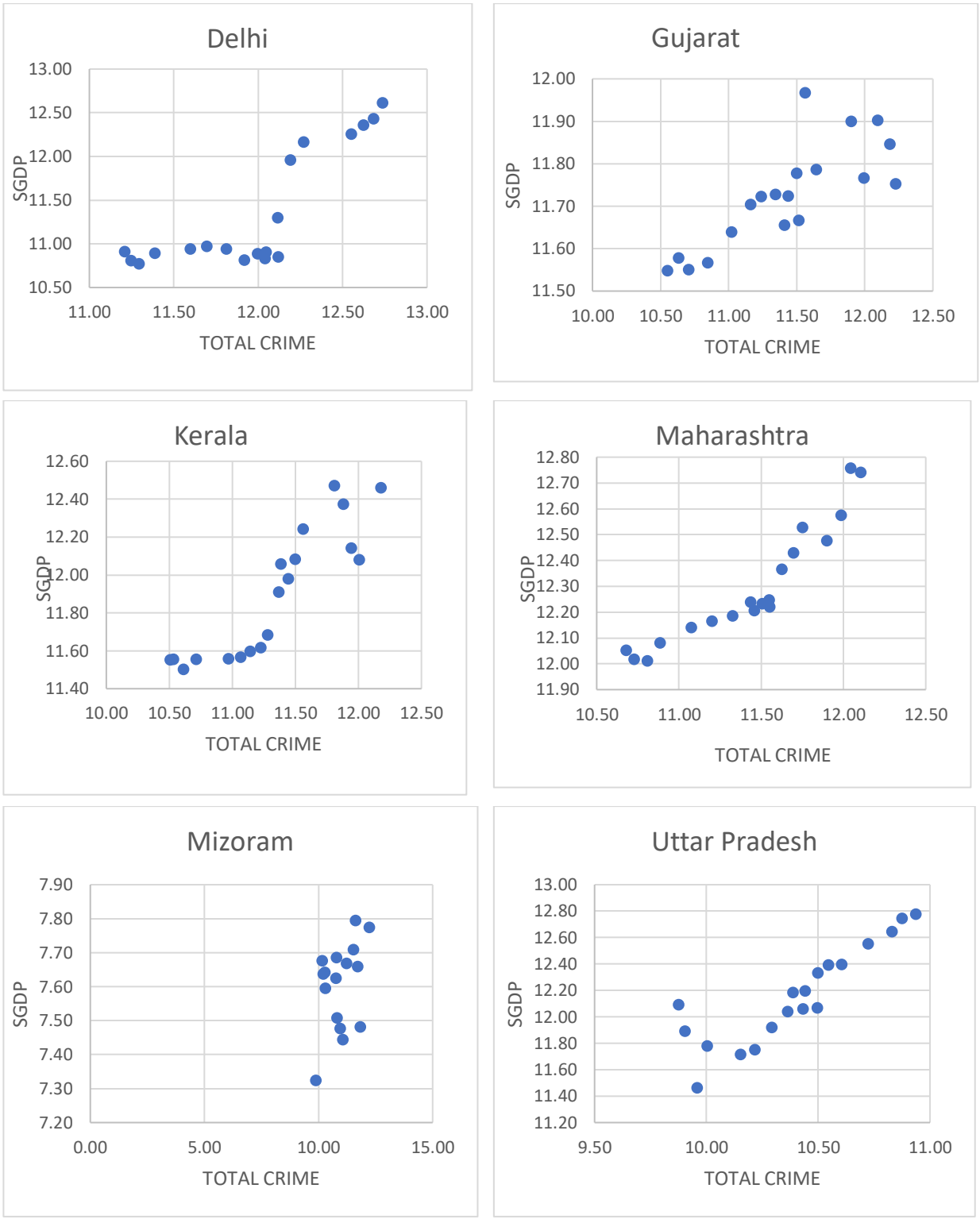
Data Source: NCRB, BPRD; Graph: Author's construction

Figure 4 demonstrates the total number of crimes reported and police strength of the respective states in 2001 and 2008. Uttar Pradesh and Maharashtra are two states that experience the highest criminal activities despite the highest number of the police force. Delhi had a high total crime rate, but the police force was almost equivalent to the reported crimes in both years. Kerala had comparatively less police strength against total crime. Only Gujarat and Uttar Pradesh had less police force during the crisis year compared to 2001.

It was noted that Mizoram had registered less total crime in 2008 than in 2001. On the other hand, Mizoram had more than 3,535 police officers compared to the 1,989 total crime cases registered in 2008. Mizoram had more police officers than the total crime in 2001 as well.

2.5 Crime and Economic Growth

Figure 5: Scatter Plot of SGDP and Total Crime (2001-2019)



Data source: NCRB, data.gov.in; Graph: Author's construction

Figure 5 demonstrates the relationship between the state GDP per capita and total crime of selected states from 2001 to 2019. The primary purpose of the graph is to look for evidence of a non-linear relationship between the two variables, which is based on the idea of the Kuznets curve put forward by Simon Kuznets in 1955. He states that as income rises, inequality in economic growth first rises and then starts to decline (Kuznets, 1955).

The graphs depict that in Delhi and four states, as SGDP rises, crime rates also tend to rise; however, several minor turning points in the curves are detected. Although the curves eventually seemed to decline and form an inverted u-shape.

CHAPTER THREE

3. LITERATURE REVIEW

The following chapter is divided into two sections elaborating past literature on crime and economic factors.

3.1 Crime and Macroeconomic conditions

a) Unemployment

During a recession, the level of unemployment in a country starts to rise, exacerbating poverty and inequality that might lead people to resort to illegal activities for their livelihood.

Gary S. Becker gave one of the earliest theoretical works about economic conditions and crime in one of his seminal works in 1968. Later, his theory, known as the economic theory of crime, states that the opportunity cost of engaging in criminal activities reduces when unemployment increases. Some people will be willing to risk conviction and find criminal activities more attractive to generate more immediate financial/material gain. The rise in unemployment will eventually lead to a rise in crime rates (Becker, 1974).

In a study concerning the US, Cantor and Land (1985) explained two effects for economic downturns (implied by unemployment) and crime. In the first effect, the positive relationship between the unemployment rate and crime is due to the motivation effect that unemployment motivates people to commit crimes. The negative relationship is due to the opportunity effect in the second effect. The crime rate may decrease due to increased unemployment as the opportunity to commit the crime is reduced because of increased guardianship by the unemployed population.

The relationship between unemployment and crime suffers from inconsistencies in empirics throughout the literature. Researchers found positive, negative, and no relationship between the

two variables. Moreover, the studies on crime are primarily based on the United States and European countries, which is not always applicable for a developing economy.

In New Zealand (Papps & Winkelmann, 2000), Sweden (Blomquist & Westerlund, 2014), and Canada (Janko & Popli, 2015), there was no significant relationship between unemployment and crime.

In a study of crime in the United States by Phillips and Land (Phillips & Land, 2012), unemployment increased vehicle theft at the city level. Their state-level analysis found that unemployment positively impacts theft, robbery, and vehicle theft. However, the relationship between theft and crime was weak at the state level. In EU-28 countries, Ayhan and Bursa (Ayhan & Bursa, 2019) found a positive relationship between unemployment and crime. In EU-28, the crime rate increase by 1.53 unit when unemployment rises by 1 unit.

In a cross-national panel of 38 countries, Krohn (Krohn, 1976) found that neither unemployment nor inequality significantly influences crime; however, the level of development and the GNP per capita was strongly correlated with property crime.

In a developing country, Tabar and Noghani (2019) studied Iran from 1997-2013 and found a significant positive relationship between unemployment and crime. A rise in unemployment will increase the crime rate by 0.44 units in Iran. In a panel of 16 developing countries from different regions, Anser et al. (2020) employed system GMM to estimate the relationship between various macroeconomic factors and crime rates. They found that unemployment increased crime rates by 0.425 units in these countries throughout 1990-2014.

In India, the relationship between crime and unemployment was mixed as well. Cui and Hazra (2017) used Johansen cointegration and granger causality to confirm the presence of a relationship between unemployment and crime rate. Their study involved time-series data from 1991-2015

with GDP per capita, unemployment, and inflation as dependent variables. Bharadwaj (2014) found that a 10 percent increase in unemployment would reduce property crime by 0.4 percent. His research concluded that poverty is a more valid factor influencing crime, especially property crime.

b) Poverty

Poverty alone cannot influence crime, and not all people living in poverty would commit a crime. There are multiple channels and circumstances through which poverty can impact or aggravate crime. Rising poverty increases the inequality between rich and poor, reducing the opportunity for better education, increasing unemployment, and worsening living conditions. All these factors can lead to crime.

Bourguignon (1999) defined *crime* as a social cost of poverty and inequality where the cost arises from the loss of material, expenditure on crime prevention, and punishment. He estimated that in the US and Latin America, the cost would be up to 3.7 percent of GDP and 7.5 percent, respectively. Bhardwaj (2014) found that a 10 percent rise in poverty would significantly increase property crime by 2.7 percent in India.

However, a panel of 16 countries Anser et al., (2020b) did not find a significant relationship between poverty headcount ratio and crime rates in system GMM estimates. However, in the Variance dynamic response (VDA) study, poverty will exert the most significant share to influence crime, and in the IRF study, poverty increases the crime rate from 2015 to 2024. Another study in Mexico (Martinez, n.d., 2012) found that a rise in poverty increased property crime by 2.37 units in 2000 and 4.36 units in 2005. Also, violent crime rose by 5.32 units in 2000 and 3.99 units in 2005 in Mexico.

c) Economic growth

Researchers have mixed views on economic growth and crime, and most of the studies are based on crime as one of the factors influencing the country's economic growth and not the other way round. However, the studies have two varying theories regarding the impact of economic growth on crime rates. One is that a bad economy might force a person to commit crimes to make ends meet, and another one is that a thriving economy may increase crime rates. A wealthy neighborhood might experience more property crime and robberies because of the availability of items of more excellent value.

In an empirical study by Oliver (2002), no significant relationship was found between the crime rate and economic growth in the USA between 1960 to 1998. However, during 2007-2010, the economist (2011) found that crime rates dropped as the United States dealt with the economic downturn.

Mulok et al. (2016) used the ARDL approach to test the relationship between crime and economic growth in Malaysia for 1980-2013. They found that crime rates increased by 0.93 percent when GDP per capita increased by one percent. They also found a two-way causal relationship between the two variables. Similarly, Dutta and Husain (2009) found that growth in the economy led to an increase in crime rates in India from 1999 to 2005. An increase in per capita state product increases the crime rate by 28.69 units in their SURE model. They argued that this could be due to the rising inequality resulting from GDP growth. Another study found the Kuznets curve in relation to economic growth and crime. Nayebyazdi (2017) found that in the European Union, during the early stages of economic growth, inequality increases and leads to more crime, but it starts to decline over time. His findings laid the basis for analyzing a non-linear relationship between crime and economic growth for Indian states.

d) The Great Recession

The past literature on crime and recession found that it would increase crime rates. However, the crime rate fell during 2008-2009, especially in the US and developed nations. It was speculated that an improved criminal justice system, better social safety nets, and cultural changes might have restricted the impact of the recession on crime rates (Rosenfeld, 2014). Furthermore, the crime itself is related to many factors that have counterinfluence, making some types of crime less likely to occur (Uggen, 2012). However, the recession would impact crime rates through rising unemployment in the long term. It was found that entering the labor market during a recession increases the arrest rate by 10 percent and conviction rate by 4 percent than entering during a more stable labor market in US and UK (Bell, 2015).

For developing economies, empirical and theoretical literature is inadequate. A study conducted by United Nations Office on Drugs and Crime (UNODC) for selected 15 countries during the economic downturn of 2008-2009 found that seven countries experienced a rise in at least one crime type. Robbery and motor vehicle theft more often occurred during this period, consistent with criminological theories that violent and property crime increases during economic stress. Homicides (violent crime) are positively associated with economic downturns in the case of countries with a high level of violence like Brazil, El Salvador, and Jamaica (UNODC, n.d.).

The lack of empirics regarding recession and India further emphasized the significance of this study. Viswanathan (2010) found that crisis spread in India through three channels: financial, trade, and confidence. Through the confidence channel that is the sentiments of consumers and investors, there was a decline in consumption by households and businesses, further reflected in higher unemployment rates in specific sectors.

Before the crisis, India's GDP growth was recorded at plus 9 percent for three consecutive years, but in 2008-09 it dropped to 6.7 percent. However, India recovered quickly in 2010 and recorded a growth rate of 7.7 percent, attributed to private investments, considerable savings, a young population, high productivity growth, and flexible fiscal and monetary policies (Dasgupta & Gupta, 2010).

Furthermore, Indian banks and financial institutions did not include mortgage back securities and credit default swaps. The service exports were not hit hard as merchandise exports, remittance was recorded at US$ 46.4 billion in 2008-09, and FDI was still high US$27.3 Billion (Aiyar, 2009). There is much literature on recession, its causes, impact, and policy measures in India; however, research that can provide evidence of a relationship between the great recession and crime in India or Indian States is sparse.

3.2 Crime and Deterrence

In simple terms, deterrence means fear of punishment. A person is restrained from committing a crime when the thought of consequences like arrest, trial, conviction, and sentence comes to his mind. The foundation of the deterrence theory is based on the work of 18th-century philosophers Jeremy Bentham(2017, [1789]) and Cesare Beccaria (1963 [1764]), which states that punishment will deter a criminal to commit crime further and the knowledge of the severity of punishment will further deter a potential offender. They perceived a criminal as a rational individual who weighs the costs and benefits of a crime.

More spending on security measures like the increasing police force, patrolling, enhancing the police force with the latest technology might deter a potential criminal and help reduce crime rates.

Moreover, the severity of punishment, quick arrest, and conviction of criminals prevent recidivism and deter future offenders from committing the crime.

A report produced by Congressional research services (CRS) (Finklea, n.d.) indicated that there are all possible results of the impact of the police force on crime- it can increase, decrease, and have no effect at all. An additional officer prevents 2.9 violent crimes and 16.23 property crimes in the US from 2009-2013 (Mello, 2019).

In a panel study of England and Wales from 1989 to 1996, a one percent rise in police force leads to a 1.32 percent fall in vehicle crime and a 0.38 percent fall in property crime (Witt et al., 1999).

In India from 1999 to 2005, the presence of more police officers resulted in 0.02 units decline in crime rates. However, an increase in conviction and arrest rate led to a positive and significant rise in crime which the author explained as a consequence of corruption and malpractice in the Indian jail system that alleviates criminal tendencies (Dutta & Husain, 2009). Nevertheless, Amaral et al. (2014) found mixed results on the presence of police force on different crimes at the district level from 1990-2007. They found that property and economic crimes are associated with an increased police force. However, violence and crime against women decreased. Also, arrest rates declined the crime rates in all categories, that is, 0.19 percent property crime, 0.32 percent violent crime, 0.06 percent economic crime, and 0.21 percent crime against women.

Throughout literature, the importance of deterrence in criminology is mentioned. Most researchers add deterrence variables like arrest rate, punishments/incarceration rate, conviction rate, police force to their model. I followed the literature mentioned above and chose three variables depending on data availability for my model.

CHAPTER FOUR

4. Empirical Strategy

4.1 Sample and Data

The study employs detailed state panel data that have been constructed on the incidence of various types of crime, socio-economic variables, and deterrence variables for the 2001-2019 period. The study aims to examine the impact of the great recession on various types of crime and find evidence of any non-linear relationship between crime and economic growth for Indian states. A total of 29 entities (states)[2] are included in the study. Only one union territory is included in the study, New Delhi, as it functions as a state and reports high crime rates compared to other union territories.

The data is collected from various government data portals. Crime and police data are collected from NCRB (National Crime Records Bureau, n.d.) and BPRD (Data on Police Organizations: Bureau of Police Research and Development, Government of India, n.d.), data for socio-economic variables are collected from OGD (Open Government Data Platform India, n.d.), (Government of India, Ministry of Education, n.d.) and Reserve bank of India (DBIE-RBI : DATABASE OF INDIAN ECONOMY, n.d.)

4.2 Variables Description

Four sets of variables are used in the study and transformed into logarithmic forms due to the difference in measurement units.

[2] See appendix for list of states included in the study

a) Crime Variables: Five types of crime variables are included in the analysis as dependent variables. The total crime (**Totalcrime**) is the incidence of all types of IPC crime reported within a state in a year. Violent crime (**VCrime**) includes all incidence of murder, attempt to murder, rape, kidnapping and abduction, dacoity, riots, arson, and dowry deaths. Property crime (**PCrime**) includes the incidence of theft, robbery, and burglary. Economic offense (**EconOff**) includes incidence of cheating, criminal breach of trust, counterfeiting, and crime against women (**CrimeAwomen**), includes incidence of rape, dowry death, immoral traffic, assault, or insult to modesty, kidnapping and abduction, and domestic violence.

b) Deterrence variables: Three types of deterrence variables are used for the analysis. First, the total number of persons arrested (**TArrest**) within a state in a year for different crime heads are collected for the research. Secondly, conviction **(conv)** is included as the number of cases disposed of by police and court for all crime heads in a year. Lastly, Police strength (**polstr**) is added to the model, including active civil police and district armed force strength. The active civil police have direct contact with the general public, and the district armed police force have their own police officers with higher firearm competence. The state armed force is not included in the study as it does not have any contact with the public and only works during public events like civil unrest, natural disasters and anti-terrorist operations.

c) Socio-economic Variables: I used unemployment, poverty, post-crisis, and state GDP per capita as a socio-economic variable for my research. The unemployment rate (**Unemp**) is measured as the total unemployed per thousand. Poverty (**pov**) is measured as the percentage of people below the poverty line. Post-crisis is a dummy variable for the great recession of 2008-09, and State GDP

per capita (**SGDP**) is the proxy for the state's economic growth. The post-crisis (**postcrisis**) dummy variable will take 0 for 2008 and 2009 or 1 for 2001-2007. As the variables constitute different units, all are transformed into their logarithmic form for a more straightforward interpretation.

d) Control Variables: There are other variables that might influence crime in the Indian states. Education and expenditure on social services might negatively affect crime rates (Benoît & Osborne, 1995; Mittal, n.d. ; Hjalmarsson & Lochner, n.d.). Therefore, my models have included education and social sector expenditure as control variables. I used enrollment in higher education (**HEdu**) as a proxy for education. It includes the number of pupils in general education courses like bachelors and master's in arts, Science and Commerce, and professional education courses like engineering, technology, education, medicine, and law.

Social sector education (**SoSecExp**) is the expenditure by the government in billions (Rs.) in social services like education, sports, arts and culture, family welfare, water supply, sanitation, housing, social security, and welfare, nutrition, and expenditure during natural calamities.

4.3 Preliminary Tests and Results

I employed two estimation procedures in this analysis. First is the standard fixed effect estimation, and the second is the Two Stage Least Square-Fixed Effect (2SLS-FE).

Besides the results from the Hausman test, there is another reason why the fixed effect is preferred over the random effect in both models. The fixed effect model is appropriate while analyzing the impact of variables that vary over time. However, in the presence of time-invariant characteristics, the fixed effect will remove its impact from the model *(Torres-Reyna*, n.d.). Some time-invariant variables that might influence crimes in the Indian states like gender, culture,

religion, and languages can be measured by applying the Random effect. However, these variables are not well maintained and hardly available in India. Since it is difficult to measure them and their exclusion might lead to omitted variable bias. Applying the Fixed effect method in such case will control all the omitted time-invariant differences and remove the bias.

The 2SLS is an extension of the OLS method, applied when the error term is correlated with the independent variables. This problem arises due to an endogenous variable (pov) on the left-hand side of the equation which is correlated to the error term. In such case, instrument variables are used in two stages. First, the predicted value of problematic variable is obtained by implementing instrument variables. In the second stage, the predicted value of the endogenous variable is used to estimate the desired model. Since the data is panel, 2SLS-FE estimation procedure is applied.

The endogeneity problem stems from three reasons - omitted variables, simultaneity, and measurement errors. As mentioned before, there are omitted variables in the models which might impact crimes. Moreover, some independent variables are highly correlated to each other, which can generate biased results. The endogeneity problem can be proved by the correlation matrix given in table 1 and the Durbin-Wu-Hausman test in table 3.

Furthermore, the results from Panel fixed effects (Results section) indicated unexpected signs for poverty and deterrence variables which indicated model specification problems.

a) Correlation Test: One of the linear model assumptions is that the regressors are exogenous; that is, they are uncorrelated with the error term. However, if any regressors correlate to the error term, they are endogenous.

Table1: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) totalcrime	1.000								
(2) Unemp	-0.239	1.000							
(3) pov	0.022	0.007	1.000						
(4) HEdu	0.728	-0.223	-0.838	1.000					
(5) conv	0.927	-0.212	-0.023	0.656	1.000				
(6) PolStr	0.829	-0.168	0.020	0.612	0.388	1.000			
(7) TArrest	0.952	-0.242	0.001	0.594	0.723	0.702	1.000		
(8) SoSecExp	0.859	-0.190	-0.885	0.132	0.780	0.638	0.131	1.000	
(9) SGDP	-0.269	-0.053	-0.332	-0.208	-0.211	-0.302	-0.248	-0.061	1.000

The results from the correlation matrix suggest that crime is strongly correlated with all the variables except poverty, unemployment, and SGDP. However, there is multicollinearity between independent variables. Poverty is strongly correlated to education and social sector expenditure and employing them in the analysis would give inconsistent and biased results. The best way to tackle the problem of multicollinearity is to drop the problem variables; however, HEdu and SoSecExp are also strongly correlated with the dependent variable and dropping them might give rise to omitted variable bias.

b) Sargan-Basmann Test: To choose appropriate instrument variables (IVs) for poverty, two requirements are taken into consideration:

-It should be correlated with the endogenous variable. Cov (z, pov)$\neq$ 0

-It should be uncorrelated to the error term (μ) and exogenous. Cov(z, μ)=0

After the fulfillment of these requirements, an identification test must be done. Here, z represents the instrument variable. Since the equation has more than one IV, it is overidentified. The equation can be just identified (one IV for one endogenous variable), overidentified (more than one IVs) but never to be under-identified. The overidentification restriction test computes

Sargan's (1958) and Basmann's (1960) Chi^2 statistics for regression estimates through instrumental variables. The null hypothesis states that instruments are valid.

Table 2: Sargan-Basmann Test Results

Test	Chi^2 Statistics	P-value
Sargan (score) chi^2 (1)	.007118	0.9328
Basmann chi^2(1)	.006792	0.9343

The p-value fails to reject the null hypothesis. Therefore, the instruments are valid.

c) Durbin-Wu-Hausmann Test: After selecting the appropriate IVs, 2SLS is executed to perform the endogeneity test. To confirm the endogeneity in the model, a Durbin-Wu-Hausman test (1954) (1974) (1978) is employed, which is performed after the execution of 2SLS regression with HEdu and SoSecExp as instrument variables (IV).

The test's null hypothesis suggests that the variables are exogenous (pov).

Table 3: Durbin-Wu-Hausman Test Results

Test	Chi^2 statistics	P-value
Durbin (score) Chi^2(1)	5.20041	0.0226**
Wu-Hausman F(1,208)	5.08312	0.0252**

** represents significance at 5 percent

The null hypothesis is rejected at 5 percent significance. It means that the variable poverty is endogenous.

d) Hausman Specification Test: The Hausman specification test is generally used to select fixed and random-effects models. The Hausman test (1978) is applied to select the appropriate model for both estimation techniques. It examines if the individual effects are uncorrelated with other regressors in the model. If the individual effects are correlated with any regressor, we cannot use random effect as it is no longer BLUE. In such cases, the fixed-effect model is more efficient and reliable. The null hypothesis of the Hausman test states that errors are not correlated with the regressor, and the alternative hypothesis states that they are correlated. A random effect is used if we fail to reject the null hypothesis, and a fixed effect is used to reject the null hypothesis.

Table 4: Hausman Specification Test Results

		Statistics	Prob>Chi2	Results
FE/RE model (Equation 2)	Chi2(10)	25.71	0.0042***	Fixed Effect
2SLS (Equation 4)	Chi2 (8)	14.8	0.0626*	Fixed Effect

*** represents significance at 1 percent, * represents significance at 10 percent

4.4 Model Specification

The hypothesized crime functions are as follows:

Totalcrime/Vcrime/Pcrime/EconOff/CrimeAWomen = f (pov, Unemp, conv, Polstr, TArrest, SGDP, SGDP2, postcrisis, HEdu, SoSecExp) [1]

All major crime heads have the exact model specification for all estimation techniques.

a) Fixed Effect Model:

$$Totalcrime_{it}/VCrime_{it}/PCrime_{it}/EconOff_{it}/CrimeAWomen_{it.} = \alpha_{it} + \beta_0 pov_{it} + \beta_1 Unemp_{it} + \beta_2 Hedu_{it} + \beta_3 con_{it} + \beta_4 Polstr_{it} + \beta_5 TArrest_{it} + \beta_6 SoSecExp_{it} + \beta_7 Postcrisis_{it} + \beta_8 SGDP_{it} + \beta_9 SGDP2_{it} + \mu_{it} \quad [2]$$

b) 2SLS-FE :

The 2SLS analysis begins with the first stage run.

$$pov_{it.} = \delta_{it} + \beta X_{it} + \theta_1 HEdu_{it} + \theta_2 SoSecExp_{it} + \xi_{it} \quad [3]$$

Where X represents all the exogenous variables included in the equation [2]. The instrument variables are HEdu (Higher Education) and SoSecExp (Social Sector Expenditure).

However, the Stata program runs the two-stage equation as a single equation, and the two steps are given here for clarity.

In the second stage equation, pov (poverty)'s predicted value is used instead of the observed poverty rates.

$$Totalcrime_{it}/VCrime_{it}/PCrime_{it}/EconOff_{it}/CrimeAWomen_{it.} = \phi_{it} + \lambda pov_{it} + \beta X_{it} + \upsilon_{it} \quad [4]$$

CHAPTER FIVE

5. Results and Discussion

The results section is divided into three sub-sections. In the first sub-section, summary statistics of all variables are given. In the second sub-section, the Fixed effect panel estimation results are given. In the third section, results from 2SLS-FE are given.

5.1 Descriptive Statistics

The descriptive statistics of variables are given in table 5 below. The maximum number of crimes is 353,131 recorded by Uttar Pradesh in 2019, and the lowest is 443 recorded by Sikkim in 2003. The considerable deviation of 80323.65 indicates that the data is more spread out to its mean value. Similarly, most crime variables have a massive deviation from the mean, which is expected. Some Indian states experience relatively more minor crimes than others.

Violent crime was maximum in Uttar Pradesh in 2018, recorded at 65,155, whereas the minimum of 51 was recorded in Sikkim in 2003. Delhi experienced the maximum number of property crimes in 2019, recorded at 251,548 and only 100 in Sikkim in the same year. The property crime averages around 17,602. The state of Tripura recorded 0 economic offenses in the year 2012. However, Sikkim, which has low crime rates with respect to major crime heads, surprisingly recorded the maximum number of economic offenses, which is 27,071. Uttar Pradesh again tops the chart in crime against women. The state recorded 59,853 cases in 2019. Sikkim again recorded only 24 cases related to crime against women in 2003. However, it should be noted that many crimes, especially crimes against women, are underreported as most women fear retaliation from the assailant, some experience shame, and some do not want to damage family

honor. Also, many petty crimes like theft and robbery of less valuable articles are not reported. The long legal process and bureaucratic red tape-ism discourage people from reporting crimes.

Table 5: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Totalcrime	551	79749.873	80323.655	443	353131
VCrime	551	9662.77	10993.135	51	65155
PCrime	551	17602.41	25192.662	100	251548
EconOff	550	3310.373	4524.686	0	27071
CrimeAWomen	551	8212.105	9680.782	24	59853
HEdu	522	768861.77	1020375.9	3850	6500000
Unemp	551	4.144	3.772	0.55	21.35
pov	539	23.709	12.672	3.48	57.2
conv	551	65739.857	78157.886	23	352340
PolStr	550	41862.042	38281.306	1641	209397
TArrest	551	170582.64	364999.43	246	3300000
SGDP	548	78621.44	62259.92	9888.25	439756
SoSecExp	550	183.137	245.808	2.6	1576.9

The maximum number of students enrolled in higher education is 6.5 million in Uttar Pradesh. The lowest enrollment recorded was 3,850 in Sikkim in 2003, which is unsurprising as there is a massive difference in the area and population of both states. The maximum unemployment rates

per thousand is 21.35 recorded in Nagaland in 2019, and the minimum is 0.55 recorded in Gujarat in 2018. The average unemployment rate for all states is around 4.14 per thousand.

The highest poverty rate was recorded in Odisha in 2009 where 57.2 percent of the population was living below the poverty line. Jammu and Kashmir had the lowest poverty rate in 2003 at 3.48% below the poverty line. Apart from Odisha, many other states like Bihar, Jharkhand, and Chhattisgarh had more than 30% living below poverty.

The maximum number of criminals convicted is recorded at 352,340 in Uttar Pradesh in 2019, and the minimum conviction was recorded at 23 in Arunachal Pradesh in 2017. However, we can see that the arrest rate is relatively high compared to the conviction rate. Almost 3.3 million people were arrested in Maharashtra in 2017, and a minimum of 246 people were arrested in Sikkim in 2014.

The civil and armed police strength has an average of 41,000 for all states. Maharashtra police have the maximum number of police force, which is recorded at 209,397 in 2017. Sikkim police recorded the lowest police force in 2011, recorded at 1,641.

The average state GDP per capita is around 78,621.88 rupees, equivalent to $1046.72 with a standard deviation of $834. The maximum state GDP per capita was recorded in Goa in 2015 at 4,39,756 rupees ($5854.62), whereas the minimum was recorded at 9,888.25 rupees ($131.61) in Bihar in 2002.

In the case of social sector expenditure, Uttar Pradesh spent the maximum amount in 2019. The state government spent approximately 1,577 Billion rupees which is equivalent to US$ 2 Billion. The Sikkim government spent the minimum amount in 2001, which is 2.6 billion rupees, equivalent to US$ 34 million.

5.2 Fixed Effect Panel Estimation

The result from Panel fixed effect estimation is given in table 6. It is given to present a reference point for acknowledging differences in the two estimation techniques used in this paper. The unexpected results are shown in FE estimation also laid the basis for undertaking an additional estimation procedure which is 2SLS-FE.

Table 6 : Fixed Effect Estimation Results

VARIABLES	(1) Totalcrime	(2) VCrime	(3) PCrime	(5) EconOff	(6) CrimeAwomen
pov	-0.00495	-0.0507*	0.0715	-0.0984*	-0.116***
	(0.0171)	(0.0306)	(0.0958)	(0.0504)	(0.0377)
Unemp	0.0297	0.0348	0.0366	0.0280	0.0589
	(0.0215)	(0.0383)	(0.120)	(0.0632)	(0.0473)
HEdu	-0.0289*	-0.0643**	0.113	-0.130***	-0.0151
	(0.0168)	(0.0299)	(0.0938)	(0.0494)	(0.0369)
conv	0.147***	-0.140**	-0.168	0.427***	0.151*
	(0.0367)	(0.0654)	(0.205)	(0.108)	(0.0807)
PolStr	-0.0370	-0.0394	0.0595	-0.0654	-0.0981
	(0.0574)	(0.102)	(0.321)	(0.169)	(0.126)
TArrest	0.321***	0.515***	0.573**	0.164	0.216**
	(0.0442)	(0.0789)	(0.247)	(0.130)	(0.0974)
SoSecExp	0.175***	0.185**	0.0452	0.183	0.215**
	(0.0416)	(0.0742)	(0.232)	(0.122)	(0.0915)
postcrisis	-0.00129	0.00337	-0.00179	-0.101*	-0.00256
	(0.0193)	(0.0344)	(0.108)	(0.0567)	(0.0424)
SGDP	0.603	-3.047***	4.775*	3.249**	1.207
	(0.441)	(0.786)	(2.462)	(1.296)	(0.970)
$SGDP^2$	-0.0262	0.142***	-0.226*	-0.128**	-0.0413
	(0.0211)	(0.0376)	(0.118)	(0.0620)	(0.0464)
Constant	2.012	21.01***	-23.21*	-17.23**	-3.579
	(2.499)	(4.458)	(13.97)	(7.349)	(5.500)
Observations	218	218	218	218	218
R-squared	0.691	0.362	0.090	0.479	0.551
Number of c_id	29	29	29	29	29

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The poverty variable has an unexpected negative sign across all major crime heads except property crime. However, only three are significant. Violent crime, economic crime, and crime against women reduce as poverty increases by one percent. On the other hand, unemployment has no significant effect on different crime heads.

Higher education reduces total crime, violent crime, and economic crime significantly by 0.02 percent, 0.06 percent, and 0.13 percent, respectively. Both conviction and total arrest increase crime significantly in all crime categories except one in each. However, a percent increase in conviction reduces violent crime by 0.14 percent. When we look at Total arrest, all crime categories are positively related to the arrest rate. A percent increase in arrest rate would increase total crime by 0.32 percent, violent crime by 0.52 percent, property crime by 0.57 percent, and crime against women by 0.26 percent. Only the coefficients of police strength have expected negative signs but are insignificant in the analysis.

Similarly, expenditure in social sector would significantly increase total crime, violent crime, and crime against women by 0.17 percent, 0.19 percent, and 0.22 percent, respectively.

The dummy variable for great recession (post-crisis) is insignificant in the analysis. However, all the coefficients have negative signs.

A percent increase in SGDP reduces violent crime by 3.04 percent but increases property crime and economic crime significantly by 4.8 percent and 3.2 percent, respectively. The negative sign of the coefficient of SGDP and the positive sign of $SGDP^2$ indicates a U-shaped curve for violent crime. It indicates that as the economy grows further, violent crimes will eventually rise. On the other hand, property and economic crimes would reduce as the economy grows as both exhibits inverted U-shaped curves.

SGDP does not significantly affect total crime and crime against women in this model.

5.3 2SLS-FE Estimation

The results from the 2SLS-FE estimation are given in table 7. Due to unusual results from the Panel fixed effect, 2SLS-FE is applied to address the endogeneity.

Table 7 : 2SLS-FE Estimation

VARIABLES	(1) totalcrime	(2) VCrime	(3) PCrime	(4) EconOff	(6) CrimeAwomen
pov	0.317**	0.266	0.238	0.169	0.294
	(0.135)	(0.177)	(0.441)	(0.251)	(0.221)
Unemp	-0.0836*	-0.0733	-0.0332	-0.0565	-0.0870
	(0.0508)	(0.0668)	(0.166)	(0.0945)	(0.0833)
conv	0.236***	-0.0666	-0.0736	0.461***	0.272**
	(0.0774)	(0.102)	(0.253)	(0.144)	(0.127)
PolStr	-0.130	-0.125	-0.00814	-0.126	-0.219
	(0.111)	(0.145)	(0.362)	(0.205)	(0.181)
TArrest	0.296***	0.459***	0.671***	0.0511	0.202*
	(0.0719)	(0.0945)	(0.235)	(0.134)	(0.118)
SGDP	3.842**	0.204	6.199	6.138**	5.281**
	(1.547)	(2.033)	(5.061)	(2.875)	(2.536)
$SGDP^2$	-0.184**	-0.0168	-0.293	-0.270*	-0.239*
	(0.0767)	(0.101)	(0.251)	(0.143)	(0.126)
postcrisis	0.0928***	0.106**	0.00933	0.00792	0.111**
	(0.0315)	(0.0414)	(0.103)	(0.0585)	(0.0516)
Constant	-14.84*	4.193	-30.95	-31.99**	-24.83*
	(8.139)	(10.70)	(26.63)	(15.13)	(13.34)
Observations	218	218	218	218	218
Number of c_id	29	29	29	29	29

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The poverty variable in the model is significant at 5 percent for a total crime only. However, as seen in the previous estimation, no crime heads turn up with an unexpected sign. The poverty variable is endogenous in this model, with higher education and social sector expenditure as the instrument variables. A percent rise in poverty would increase total crime by 0.31 percent. In the global Multidimensional Poverty Index released by United Nations Development Program

(UNDP) in 2019, India is selected as one of the ten countries that reduced their MPI values. India has lifted 271 million people out of poverty between 2006 and 2016. Amongst the Indian states, Jharkhand has reduced the incidence of poverty from 74.9 percent in 2005-06 to 46.5 percent in 2015-16 (*(MPI) | Human Development Reports*, n.d.). This reduction in Multidimensional poverty might placate crimes in the Indian States. However, 28 percent of the total population still lives in poverty in India in 2019 and have potential to influence crimes. Another explanation for a significant positive total crime could be that many poverty programs are not directed towards the target groups. For example, instead of assisting poverty-stricken people who are more prone to commit crimes, many economic programs mainly focus on women, children, physically challenged, and elderly. Youth, unemployed, uneducated, and unskilled are almost always left out of these programs and hence might resort to criminal activities to fulfill their needs.

Unemployment was unable to affect crime significantly in the previous model, but it significantly affects total crime by reducing it by 0.08 percent. All other crime variables are still insignificant.

The results were expected for unemployment as, throughout the literature, the effect of unemployment is mixed. There has been positive (Ayhan & Bursa, 2019) (Mir Mohamad Tabar & Noghani, 2019), negative (Bharadwaj, 2014) (Cantor & Land, 1985), or no relationship (Janko & Popli, 2015) (Krohn, 1976) found between unemployment and crime by various researchers.
Cantor and Land (1985) explained a negative relationship as an opportunity effect of unemployment. Unemployed are available to provide better security and protection to their properties and families than people at work, creating less opportunity for criminals to participate in any criminal activities. Hence, it will create a negative effect on crime rates.

The three deterrence variables show similar signs and significance in both models. The conviction rate significantly increases total crime by 0.23 percent, economic crime by 0.46 percent, and crime against women by 0.27 percent. Only violent and property crimes exhibit expected signs but are insignificant in the analysis. Conviction does not always mean jail time for many criminals in India. The convicted can appeal at a higher court and be out on bail if it is a bailable offense (section 389 CrPc, n.d.) allowing the offender to commit crimes further.

The rise in crime against women can be explained by the presence of relationship between the offender and the victim. Most of the culprits are husbands, family members or relatives. Women are forced to retract complaints after the conviction of the assailant many times, leading to a cycle of harassment for women. Moreover, corruption and bureaucracy within the Indian policing system and the legal system can keep the culprit out of the system for a long time.

The arrest rate is also positively significant in affecting most major crime heads except economic crime. A percent increase in arrest would increase total crime by 0.29 percent, violent crime by 0.45 percent, property crime by 0.67 percent, and crime against women by 0.20 percent. The results align with the findings of Dutta & Husain, n.d. (2009), who found a positive relationship between conviction and crime, and arrest and crime for India.

An arrest does not necessarily mean conviction and incarceration of that person. The inefficient and weak criminal justice system makes trials longer, affecting appropriate and sound judgment. A person can be acquitted due to lack of evidence, be out on bail, or be released after a warning for petty crimes, which can act as an anti-deterrent for criminals. Moreover, corruption, especially nepotism, makes it worse. Criminals with high profile families or relatives like politicians, people in business, or powerful positions have leeway to circumvent the legal system according to their suiting. Also, in many Indian states and their respective policing system, corruption runs from the

lowest level to the highest position, making disposal of criminal cases very rigid. The source of this corruption is the power vested in police officers (Lamani & Venumadhava, 2013). Criminals can walk freely by simply paying a bribe to the officials, which further creates a haven for criminals and encourages them to commit crimes.

The strength of the police force is insignificant in affecting all crime heads, but the signs are as expected and in line with previous findings (Mello, 2019) (Witt et al., 1999). An increase in the police force will reduce the crime rate.

SGDP and $SGDP^2$ were insignificant in the previous model for the total crime. Here, both significantly impact total crime, economic offense and crime against women. A percent rise in SGDP would increase total crime by 3.8 percent, and a percent rise in $SGDP^2$ would decrease total crime by 0.18 percent. Similarly, economic offense would rise by 6.1 percent as SGDP increase and starts to decline by 0.3 percent as $SGDP^2$ increases further. Crime against women rise by 5.2 percent and tend to decrease by 0.23 percent as SGDP continue to increase. This indicates the presence of an inverted u-shaped curve for total crime, economic offense, and crime against women against economic growth. As the economy grows, crime rates will rise and decline after reaching a certain point. A possible explanation for this relationship could be the increasing income inequality. The rise in income does not applied to all the sections of society here. States like Gujarat, Maharashtra, Haryana, Kerala, and Punjab are still the wealthiest states while, Bihar, Assam, Odisha, Rajasthan, Uttar Pradesh are at the bottom. There is a presence of inequality within these states too. This social injustice might encourage people to commit violent crimes and property crimes against the affluent members of society. In lack of a potential victims, criminals

always target the weakest members of the community: children or women to vent out their frustrations. Hence, crime against women goes up.

As we know, economic growth can increase the inequality gap, which may impact crime positively. However, over years as the economy grows and inequality reduces, crime starts to decline (Nayebyazdi, 2017). In this estimation, all three significant crime categories exhibit an inverted U-shaped curve, which is different from the previous one where the three crime categories have varying curves.

The dummy variable post-crisis is positive and significantly impact crime in this estimation technique. During the great recession (2008, 2009), total crime rose by 0.09 percent, violent crime by 0.10 percent, and a crime against women by 0.11 percent compared to the pre-crisis period, other things being constant. It is in line with the findings of UNODC regarding developing countries. They found that violent crime will increase in countries more prone to violence. During recessions, unemployment is high. For a densely populated country like India, the unemployment rate of more than 5 percent in past two decades is a considerable number (*Statista*, n.d.). The crime will likely go up in such situation due to frustration amongst unemployed. However, it contradicts current literature that expects a negative relation between the great recession of 2008-09 and crime rates due to increased guardianship. The studies were based on advanced economies only. Therefore, it is not appropriate to expect the same outcome for developing countries.

CHAPTER SIX

6. Conclusion

6.1 Summary of Findings

This paper analyzed the impact of socio-economic conditions, specifically poverty, great recession, deterrence, and economic growth, on five major crime categories for the Indian states. The sample covers 28 states and one union territory of India, ranging from 2001 to 2019. A total of 10 independent variables are used with five dependent variables. I applied two different estimation techniques: Panel Fixed effect and 2SLS-FE, which produced different outcomes. The fixed effect panel estimation did not provide enough information and suffered from an econometric issue. Poverty turned up with unexpected significant negative signs, and unemployment was insignificant in the first estimation. Therefore, 2SLS-FE is used to overcome the endogeneity issue and present a better result.

The main findings of the research are as follows:

1. The poverty variable is positively related to the crime categories and significantly impacts total crime.
2. Unemployment reduces total crime through the opportunity effect first put forward by Cantor and Land (1985).
3. The great recession of 2008-09 had a significant impact on crime. It increases total crime, violent crime, and crime against women in Indian states.
4. There is a non-linear relationship between the economic growth of states and crime. Total crime, economic crime, and crime against women have an inverted u-shaped curve

indicating a rise in crime at an initial increase in SGDP and then drop as the economy grows.

5. The two deterrence variables, conviction and police strength, have a significant impact on crime. Conviction and rise in police force increase the crime rate in Indian states due to the widespread corruption in the policing system. However, the deterrence effect does not take place.

As we know that India suffers from poverty, and at least two-thirds of the population live in poverty (Poverty in India, n.d.). For a vast population, that number is enormous. We cannot always conclude that only poor people commit crimes, but poverty likely creates a premise for criminal behavior. Apart from property crime, poverty can also influence a person to commit violent crimes and crimes against women by affecting their psychological well-being.

There are numerous policies and programs in effect that aim to eradicate poverty. However, the reach of those programs is uncertain and does not always reach the target population. The incompetent governance, especially in rural areas and widespread corruption, obstruct such programs' desired results. So, education is the key here which can enhance human capital. Investment in human capital accumulation would target the problem areas like unemployment and poverty and reduce crimes in future. Furthermore, to overcome the ignorance of general population, government officials should educate people about poverty programs through various channels like advertisements on radios, TV and encourage them to participate.

The Indian legal system should be more versatile. Incorporating new laws and procedures according to the present crime scenario can enhance the effectiveness of the justice system. The major drawbacks of Indian legal system are the lack of transparency, lack of coordination and

corruption. This should be addressed to have consistency in the working of the legal system. More fast track courts, judges and lawyers should be appointed for speedy trials and conviction.

The great recession's impact was not as severe as in the developed countries, but the rising inequality does pose a significant threat. Again, investment in education, raising the minimum wage, and generating more employment opportunities will help shorten the gap.

Secondly, to curb crime, the monetary penalty should be high and corrupted officials should be monitored regularly. For ex-offenders, programs and schemes should be formulated to find employment, education, and accommodation that further enables them to live dignified lives and prevents them from reoffending.

6.2 Limitation and Future Recommendation

There are certain limitations to this research. First is the availability of the data. The census of India is taken every ten years, and the latest data available was from 2011. Some essential variables that can influence crime, like inequality and population, are not included because the data are unavailable. Secondly, Union territories and a newly formed state, Telangana, are not included as data points were not maintained for the years selected in this research. Their inclusion might affect the outcome presented in this study.

For future research, high crime states and low crime states can be studied separately to have a more concrete idea about which policies or program works better in each case. If data permits, including data points from districts, towns, and villages can also give a new approach to this research. Many crime studies suggested including a lag variable of crime as the past crime rates have potential to influence crimes in the future.

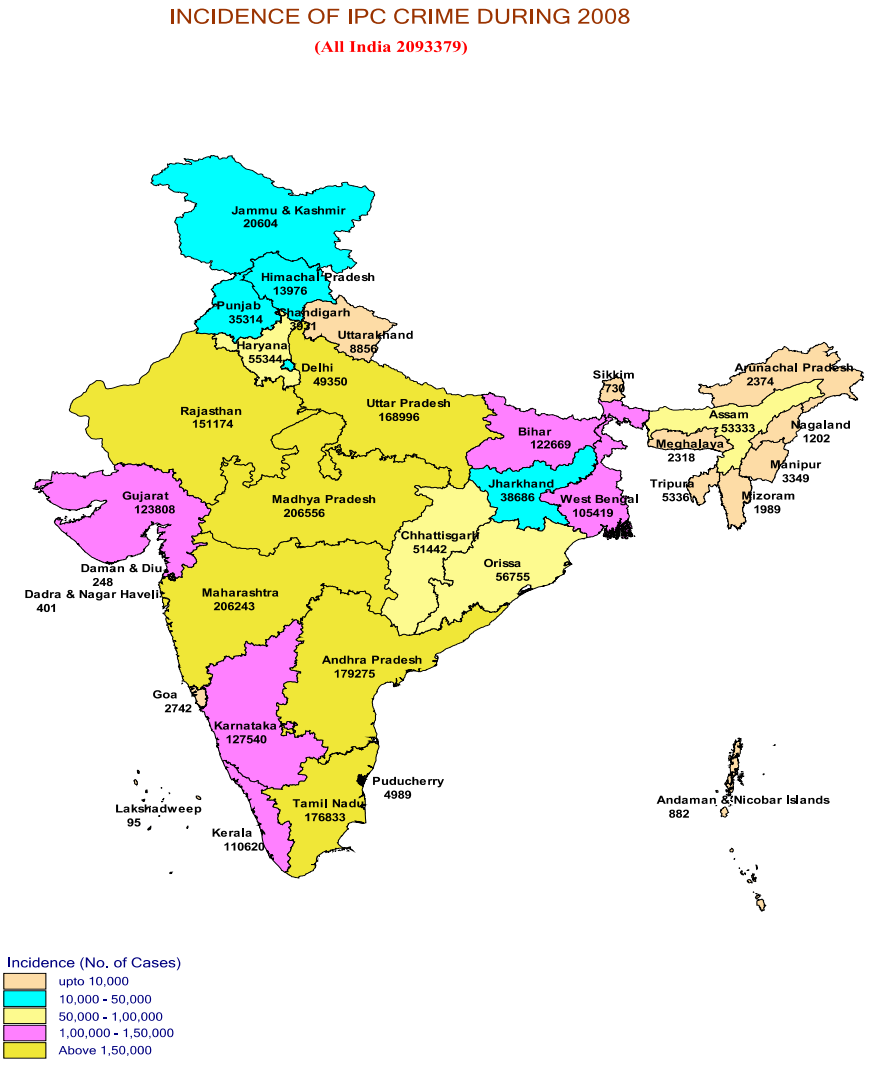
As the deterrence variables to do not pose deterrent effect on crime variables in the Indian states in this paper, including a lag of police strength variable might present different results. The number of police force from last year can influence crime in the present year. However, restricted knowledge in advanced econometrics could not facilitate the idea in this paper. The same model can be replicated by including these additional variables which can further enhance the findings of this paper.

APPENDIX

LIST OF STATES

Andhra Pradesh	Jharkhand	Odisha
Arunachal Pradesh	Karnataka	Punjab
Assam	Kerala	Rajasthan
Chhattisgarh	Madhya Pradesh	Sikkim
Delhi (Union Territory)	Maharashtra	Tamil Nadu
Goa	Manipur	Tripura
Gujarat	Meghalaya	Uttar Pradesh
Haryana	Manipur	Uttarakhand
Himachal Pradesh	Mizoram	West Bengal
Jammu and Kashmir	Nagaland	

Figure 6: Total IPC Crime map of India 2008



Source: NCRB Executive summary 2008.

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