

## Property Crime and Development Indicators: A Comparative Analysis between North-East and South-West Regions in India

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### Abstract

*This paper examines the relationship between property crime and development focusing on financial and fiscal indicators. This study provides a comparative analysis between North-East and South-West regions in India. As per geographical position of states this study has selected two regions in India: North East (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura) and South West (Gujarat, Maharashtra, Karnataka, Goa, Kerala, Tamil Nadu, and Andhra Pradesh). Per capita GSDP is an indicator of development which plays a significant role for reduction of property crime rate in both regions. However, C-D ratio, the indicator of financial development, helps to reduce property crime in South-West region only. Industrial worker is taken as proxy for urbanization which reflects the negative impact on property crime in South West while positive in North East region. This study focuses on fiscal indicators like own tax and own non-tax. The findings suggest that tax imposition may reduce the property crime in some cases.*

**Key Words:** Property crime, C-D ratio, GSDP, North East, South West, Industrial Worker, Social Expenditure, Own Tax, Non-Tax

### 1. Introduction

Gary Becker (1974) identifies the relationship between criminal activities and several socio-economic factors. Becker (1974) analyses criminal behaviour focusing on economic incentives to engage in illegal actions in his seminal work on *Crime and Punishment*. Following Gary Becker several social scientists, researchers and policymakers have studied it and highlight different social and economic aspects. Literature shows that property crime depends on socio-economic factors like poverty, unemployment, literacy rate, business cycle, demographics, criminal justice system, and family structure etc. (Ralph, C. Allen 1996). Property crime increases due to rising unemployment rate, wage inequality and higher growth rate of asymmetric property (Clarke and Feilding 1999). Unemployment has a positive impact on property crime (Melick 2003, Sieger et.al 2014, Papps et.al 1998, Kizigol et.al 2017, Khan et.al 2015). However, there is negative relationship between violent crime and unemployment (Recher 2016) but unemployment has positive impact on both property and violent crimes in US (Ebmer et.al 1998). Unemployment rates are not significant for other types of violent crime except robbery (Bandopadhyay et.al 2011). Socio-economic factors like income inequality, unemployment rate, and poverty are responsible for specific types of

crime like property and violent crime (BerkOzler 2005, George Saridakis 2004). Poverty and income inequality have negative impact on property crime (Ralph, C. Allen 1996, Alexander CottePoveda 2012, Char Foon Tang 2008, George Saridakis 2004). Many papers suggest that crime has negative effect on economic growth (Ahmed et al. 2014, Ignatius N Kathena, J. P S shefeni 2017, Toddsandler, Gaibullove 2008). This relationship varies in different countries (Ragnasdottir 2014). According to Chakroborty (2012) economic growth has no impact on property crime and literacy rate also has no significant role to play on property crime in India. Level of education may controls crime (Brink et.al 2010, Kizigol et.al 2017, Lobonot et.al 2017, Jalil et.al 2010). Liberalization leads to accelerate economic growth while crime does not reduce in India (Dutta and Hussain 2009). There are two types of crime in India, one is cognizable and another is non-cognizable (Dutta and Hussain 2009). In case of cognizable crime, police takes action on receipt of complaints; however, non-cognizable crimes are left to be pursued by affected parties in court, and police initiates investigation into such crimes with magisterial permission (Dutta and Hussain 2009). Rahul Chakroborty (2014) categorizes two types of crime mainly in India - one is IPC (Indian Penal Code) and other one is SLL (Special Local Law). IPC includes in property and violence crime likes illegal narcotics, gambling etc. and SLL is special local laws (Chakroborty 2014). Crimes are also classified as economic crime like cheating, forgery etc. and property crime such as theft, robbery, dacoity etc. Literature mainly considers four types of offenses which are included in property crimes like Robbery, Dacoity, Burglary and Theft. Robbery rate declines in India from 2.09% to 1.1% with rising economic growth rate by 3.72% during 1991-2011 (Surandar Kumar 2013). Urbanization may influence the Crime (Soh 2010, Jalil et.al 2010, Glaeser et.al 1996).

Literature mostly focuses on the relationship between socio economic indicators and property crime. Generally property crime happens for greed of money. However, there is no such evidence of studies on relationship between property crime and monetary issues or fiscal policy (indicators). There is dearth of literature which captures the impact of financial or fiscal indicators on property crime in India. Is there any role of financial factors on property crime? There is no research probably which explores the relationship between financial/fiscal indicators and traditional property crime in India. There is no study on property crime at regional levels in India. This study attempts to fill up this gap. In this context, this study attempts to explore any connection between financial/fiscal indicators and property crime in India and its different regions. For the said purpose we consider and incorporate financial and fiscal indicators in the analysis. Credit-Deposit (C-D) ratio represents proxy of financial development. Own- Tax revenue and Non- tax revenue income of the government are the fiscal indicators. These indicators vary across states and regions in India.

This paper identifies the variations in the relationship between property crime and economic factors across regions in India. This study has selected two different regions in India - North East and South-West regions.

According to the National Crime Records Bureau (NCRB), mainly Dacoity, Robbery, Burglary and Theft represent the property crimes in India. Most of the paper considers a single offense of property crime to establish the relationship with socio- economic determinants. This is the scope to fill up the gap using all types of property crime together and attempt to establish the relationship between crime and socio-economic and

financial/fiscal determinants across the two regions in India. We have considered mainly North-East and South-West region in India. This study analyses occurrence of crime and socio-economic-financial indicators considering 15 states; 8 states belonging to the North East (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim) and 7 states belonging to South West (Andhra Pradesh, Tamil Nadu, Kerala, Karnataka, Goa, Maharashtra, and Gujarat).

Many literatures address the impact of GDP per capita, urbanization and education on property crime. We have considered two development proxy variable GDP per capita and industrial workers<sup>1</sup>. Social expenditure includes in expenditure on health, education, social safety, etc. Social expenditure represents the proxy of human capital formation and social security.

The rest of the paper is organised as follows: Next Section 2 reviews the state of art of literature. Section 3 describes data and methodology, section 4 discusses results and finally section 5 concludes with remarks.

## 2. Literature Review

Words crime came from Latin word and meaning 'to accuse' and a Sanskrit word 'Kri' (to do). Combining to forms of word and meaning is "most validly accusable act". Crime is a social and economic phenomenon. Crime may define from six different perspectives as: i) a public Wrong, ii) moral Wrong, iii) conventional Wrong, iv) Social Wrong, v) procedural Wrong and vi) a Legal Wrong.

*As a Public Wrong:* Concept of public law is very wide that includes all legal wrongs but all legal wrongs are not crime. Public law includes only institutional and criminal law. *As moral Wrong:* Some immoral act does not considered as a crime likes ingratitude, misbehaviour, callous disregard suffering of others though immoral but not crime. Some harmless crime likes vagrancy and loitering, consorting and possession of prohibited goods like drug weapons. *As conventional Wrong:* There is no crime without law. Criminal law is defined conventionally as a body of specific rules regarding human conduct which have been promulgated by political authority. It is applicable for all members of the society. *As Social Wrong:* Human being should respect each other and help to distinguish the better from worse and encouragement to choose the former and avoid later. In the conduct of human beings towards one another, it is necessary that general rule should for the most part, be observed in order that people may know what they have to expect. Crime concept has been changed time to time. *As procedural Wrong:* Criminal offense is basically creation of the criminal policy which is adopted from time to time. Some section of the community who are powerful or astute enough to safeguard their own security and comfort by causing the sovereign in the state to repress the conduct, which they feel may endanger position. *As A Legal Wrong:* Crime discusses at legal notes. Crime is an intentionally act or omission in violation of criminal law. Committed without defence and jurisdiction and sanctioned by state as a felony or misdemeanour.

Criminologist have divided crime in six different category likes violent, property, organized, consensual and white colour crime. Violent crime are includes in homicide, assault, rape and sexual assault, robbery. Property crimes includes in burglary, motor

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<sup>1</sup>Industrial worker can be considered as a proxy of urbanization.

vehicle theft, Arson. Organized crime includes in Mafia type crime, when crime is executed by an organization. Consensual crime includes illegal prostitution, intakes illegal drugs. These types of crimes are mainly harmless. White colour crime are includes in all types of fraud where crime related economic loss.

There are so many literatures which focuses several socio economic determinants of crime. Some of them are discussed. *Ahmed et al (2014)* investigated a relationship between crime rate and economic growth in Pakistan using time series data for the period of 1980 to 2011. Paper concludes that crime has significant impact on growth in long run. *Khan et.al (2015)* observed social factors determining crime. In this paper authors cover several crime like murder, attempt to murder, robberies, dacoity, burglaries, kidnapping, and theft in Pakistan during 1972-2011. Social factors are unemployment, higher education, GDPPC and poverty. Author applied ADF test, Co integration, VECM and several diagnostic test like LM, ARCH, heterosedastisity, Ramsey, cumsum test and normality. The major findings of this study are (i) higher education lead to lower crime rate, (ii) GDPPC, Poverty and unemployment have significantly positive effects on crime, and (iii) higher income leads to more crime in Pakistan. *Ignatius et al (2017)* identified a relationship between economic growth and crime rate in Namibia, using secondary data which collected from annual report of Bank of Namibia over the period 2000Q1 to 2015Q4time series analysis. The co integration test shows that there is a no long term relationship between two variables crime and economic growth respectively. Granger causality represents bidirectional causality running from economic growth to crime rate vice versa. Impulse Response Function shows that increasing crime rate does indeed result in a decline of economic growth. Since crime rate leads to decline in economic growth then criminal justice forum should be adopted some policy which helps to reducing crime and the fear of crime and their social and economic cost. *Dritsakis et al (2009)* explained a relationship between various criminal activities in Greece and explained it. A criminal offence is dependent on socio economic determinants and justice system by using time series data (1971-2006). They identified that unemployment rate, real consumption per employee, number of convict, net migration per 100 people are the socio economic determinants of crime rate. The result shows that economic depression creates criminal activities and opportunities and economic prosperity created for gaining profit from illegitimate action. Conviction rates proves to be lower significance and migration rates are more insignificant than conviction rates. *Kizigol and Selim (2017)* focused on the impact of socio economic determinants on Crime in Turkey and 28 countries of European Union during 2001-2010. Author considered different types of crime like homicide, violent crime, robbery, domestic burglary, motor vehicle theft, and drug trafficking. Many social factors like school enrolment rate, growth rate, inflation, GDP per capita, unemployment, urban population, no of police are considered as an independent variable. The main findings of this paper GDP per capita, unemployment and inflation are positively significant with crime. Enrolment rate and number of police may reduce crime rate. Urbanization has positive impact on crime in Turkey and EU 28. *Lobont et al(2017)* investigated relationship between socio economic factors and economic crime in Romania during 1990-2014. Economic crime includes in forgery, tax evasion, frauds, financial secret revelations, defalcation, Abuse of office. Authors applied Granger causality, ADF test and co integration analysis. The result highlighted that Urbanization have robust impact on crime. Income inequality is causes of economic

crime also. Calva et al (2015) analysed and explained the impact of income inequality on crime in a unique context during the Mexico's drug war. Income inequality and crime data (more than 2000 Mexican municipalities over 20 years) were used in their study. Authors also applied Gini coefficient and OLS method. Gini coefficient captured the inequality of income. Result shows that increases of more than 10 drugs related homicides per 100000 inhabitants due to increment of 1 point in Gini coefficient across Mexican municipalities. There were no improvements of income inequality during 2005-2010. Allen(1996)expressed a relationship between property crime and socio economic condition by time series analysis using data from 1959 to 1992. They considered that Socio economic parameters are poverty, business cycle, demographics, criminal justice system, and family structure. Robbery, burglary, vehicle theft are considered as criminal activities, author adopted cross correlation analysis which shows that unemployment has a positive impact on crime. It also suggests the strong correlation between criminal justice and crime. Poverty and income inequality has negative impact on property crime. Age and family structure has little impact on property crime. Ray et al (2006) shows the impact of crime on the economic growth in central city of the country. Authors collected data from metropolitan city of 32 states in US (1982-1997). OLS result shows that violent crimes of central city have strong impact on economic growth in sub urban areas but property crime have weak impact on economic growth. Urban migration continues due to urban crime. Cotte Poveda (2012 )focuses on the impact of socio economic indicators on crime, using grouped data collected data from 7 cities in Colombia in the period of 1984 I -2006 II. The author take violent crime as a dependent variable and explanatory variables are poverty, price level, unemployment, GDP per capita, education, employment per industry salaries real. Rising education level reduced crime. Poverty and income inequality are raising crime. Higher population represents higher crime. Lower unemployment indicates lower crime. Inflation generates increasing homicide rate. In contrast drug seized and violence both are negatively co related to each other. Tang(2009) observed a linkage between crime, unemployment and inflation in Malaysia. The result shows that both inflation and unemployment are very significant for crime. Gillani et.al (2009) investigated a relationship between Crime and socio economic determinants in Pakistan during 1996-2007. Author mainly considered six types of crime in this study likes Robbery, Kidnapping, Dacoity, Burglary, Cattle theft and Murder. The result shows that Inflation, unemployment and poverty play major role for rising crime in Pakistan. Berk Ozler (2005) examined the impact of local inequality on violent and property crime in South Africa. The result denotes that inequality leads to crime in general. Fowles and Marva(1996)find out a robust relation between wage inequality and criminal activities in US, by using OLS and EBA technique with the help of cross sectional data set for major MSAS over period 1975-1990. The result shows that wage inequality is very significant for violent crime but insignificant for property crime. Poverty and unemployment both factors are responsible for all types of crime. Glaeser and Sacerdote (1996)find out the main reason of city crime with help of data collected from NLSY on criminal behaviour and uniform crime reports. This study uses OLS and Probit model. The paper explained that solvent people lives in city and why they are victimized by poor criminals. It also shows that probability of arrest is lower in city but author cannot detect the reason. Main Objective of Kumar (2013)is to identify and measure the impact of crime rate on economic growth by using balanced panel data set

on the 25 states over the period of 1991-2011. Author focused on real per capita state domestic product and measures state criminal activities using data on international homicide and robbery rate. Author applied bivariate and multivariate methods. Author identified reducing homicide rate from 5.93 (1<sup>st</sup> quartile) to 4.59 (median) is supposed to enhance the annual growth rate of per capita net state domestic product about 11% points and a reduction robbery rate to 1.1 from 2.09 increases growth by 3.72% points. The evidence shows that estimated effect is large in magnitude. Lin (2009) suggests that Crime and Police negatively related with each-other in US. Sales tax have positive impact on the property and violent both respectively. Author adopted 2SLS and OLS methods. Manna et al(2018) investigates the relationship between social economic factors and crime in India during 1990-2015. Author applied new methods of Granger causality which is Toda Yamamoto and Johansen Co integration. Author takes GDP, HDI, average inflation rate and Unemployment as socio-economic determinants. All variables are co-integrated with crime. Toda-Yammato result shows that there is unidirectional relationship between GDP, HDI and Unemployment. Kelly (2000) focuses on the relationship between crime and income inequality in US. Here considered two crimes violent and property respectively. Income inequality has no impact on crime but have strong impact on property crime. Police force and poverty eradication plays a vital role for reducing property crime but less important for violent crime. Objective of Tushima (1996) is to study the impact of unemployment, poverty, economic inequality on homicide, robbery, larceny rates in Japan. Author applied multiple regression analysis. Result suggests that poverty and unemployment plays a positive role on robbery and homicide. Recher (2016) focuses on the relationship between unemployment and crime in Croatia. Unemployment has strong positive impact on robbery and larceny but negative impact on violent crime. Size of police helps to reduce the property crime falls but increases the violent crime. Pappset.al (1998) examine the relationship between the relationship between Crime and unemployment in New Zealand. This research covers during the period of 1984-1996. Author applied FEM and REM models in panel data. Unemployment has positive impact on crime. Chapman et. al(1998) examine the relationship between unemployment and crime in Australia. Authors cover the time period of 1921-1987. Authors added new variable which is female employment. Female employment has positive impact on homicide rate.

### 3. Data and Methodology

Data on property crime is taken from the National Crime Records Bureau (NCRB), the Govt. of India; and data of tax revenue, non- tax revenue, income (Gross State Domestic Product (GSDP) per capita (GDP per capita or GDPPC)), social expenditure, C-D (Credit-Deposit) ratio, and industrial workers etc. are collected from the RBI Handbooks 2010 for the period of 1994-2017. Own Tax, Non –Tax, Social Expenditure and GSDP estimated to constant rate under the base year 2011-12. Variables are divided into four major groups: Development, Social, Financial and Fiscal indicators. Details of the concern variables are given below:

**Property crime**

According to the National Crime Records Bureau, four crimes (Dacoity, Burglary, Robbery and theft) are included in the Property crime. Data are measured as property crime per lakh population.

**Development Indicator**

There are two proxy variables of the development indicators:

State GDP per capita: It is State gross domestic product per head. This data estimated at constant rate (base year 2011-12).

Industrial worker: No of industrial workers per lakh population in each state.

**Social Indicator**

Social Expenditure (per capita): The social expenditure is the proxy of social security. Social expenditure includes spending on Education, Art and Culture, sports, Health, water supply etc. It is measured as per head.

**Financial Indicator**

Credit-Deposit (C-D) ratio: C-D ratio is considered as proxy of financial development indicator. It is the ratio of bank lending to deposit. It also indicates the capacity of lending money of the bank and business opportunity.

**Fiscal Indicators**

We have considered two fiscal indicators: Own tax and Non- tax revenue.

Own-Tax-Revenue (per capita): Tax revenue is income of the state government. This data estimated at constant rate (2011-12 base year).

Non-Tax-Revenue (per capita): Non –Tax revenue is also income of the state government. Fine and penalty charges are important component of non-tax revenue. This data estimated at constant rate (2011-12 base year).

Considering all variables<sup>2</sup> for the said period we have compiled a panel data set for states belonging to the region. We have selected Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim for North-East and Andhra Pradesh, Tamil Nadu, Kerala, Karnataka, Goa, Maharashtra, and Gujarat for South- West region. Time period is 24 years (1994-2017) and number of states in North East and South West are 8 and 7, respectively. We apply panel data analysis techniques for the study purpose and the basic model is

$$y_{it} = \alpha + \beta x_{it} + \varepsilon_{it} \dots (1)$$

Where  $y_{it}$  = Property crime of state  $i$  in time  $t$ ;  $x$  is set of independent variables (GSDP per capita, C-D ratio, Industrial workers, social expenditure, own tax, and non-tax),  $\beta$  is a set of coefficients of corresponding independent variables, and  $\varepsilon$  is random disturbance term. For panel data analysis, let  $\alpha$  is decomposed as  $\alpha = \alpha_0 + \alpha_i + \alpha_t \dots (2)$ , where  $\alpha_0$  is invariant of  $i$  and  $t$  while  $\alpha_i$  varies with individual  $i$  and  $\alpha_t$  is time variant. Plugging eq (2) into eq (1) one problem may arise regarding correlation or co-variation between  $\alpha_i$  and  $\varepsilon_{it}$ . In this context we have to identify it and accordingly select either fixed effect (FE) or random effect (RE) model for estimation purpose. The Hausman  $\chi^2$  test criterion is used here for selection of fixed effect (FE) over random effect (RE) model.

We analyse the above said model in several ways by combining variables and describes

<sup>2</sup> All data link available in reference list.

as Model 1, Model 2, etc. It will be available in the estimated results in respective tables which will be discussed in next section. We take logarithm of both dependent and independent variables. Brief descriptions of data are available in Table 1.1 and Table 2.1 which provide basic information regarding concern variables.

Table 1.1: Summary Statistics in South West Region

Group factors	Variable(ln)		Mean	SD	Min	Max	Observation
Crime	Property crime	Overall	3.76	0.398	2.85	4.93	N=168
		Between		0.341	3.27	4.18	n =7
		Within		0.241	2.66	4.50	T=24
Development	GDP Per capita	Overall	11.20	0.568	9.82	12.58	N=164
		Between		0.399	10.48	11.85	n =7
		Within		0.429	10.53	12.38	T=23.42
	Industrial worker	Overall	7.09	0.376	6.15	8.03	N=161
		Between		0.334	6.74	7.55	n =7
	Within		0.212	6.34	7.62	T=23	
Social	Social Expenditure	Overall	8.35	0.550	7.41	9.71	N=164
		Between		0.350	8.18	9.15	n =7
		Within		0.446	7.53	9.47	T=23.42
Financial	C-D Ratio	Overall	4.14	0.456	2.9	4.81	N=168
		Between		0.460	3.23	4.62	n =7
		Within		0.540	-2.55	3.64	T=24
Fiscal	Tax Revenue	Overall	8.56	0.534	7.27	9.78	N=164
		Between		0.311	8.23	9.23	n =7
		Within		0.450	7.60	9.29	T=23.42
	Non Tax	Overall	6.99	0.988	5.7	9.76	N=163
		Between		0.988	6.32	9.18	n =7
	Within		0.376	6.12	8.31	T=23.28	

Table 2.1: Summary Statistics in North East Region

Group factors	Variable(ln)		Mean	SD	Min	Max	Observation
Crime	Property crime	Overall	3.61	0.664	2.1	5.28	N=192
		Between		0.635	2.97	4.87	n= 8
		Within		0.293	2.73	4.64	T=24
Development	GDP Per capita	Overall	10.86	0.730	9.69	14.91	N=180
		Between		0.433	10.41	11.59	n= 8
		Within		0.604	9.83	14.17	T=22.5
	Industrial worker	Overall	5.43	0.942	3.3	7.63	N=123
		Between		0.981	4.51	7.17	n= 6
	Within		0.560	3.77	6.55	T=20.5	
Social	Social Expenditure	Overall	8.96	0.895	7.51	13.36	N=180
		Between		0.667	7.94	9.91	n= 8
		Within		0.639	7.75	12.41	T=22.5
Financial	C-D Ratio	Overall	3.36	0.390	2.52	4.18	N=192



		Between		0.252	2.97	3.72	n= 8
		Within		0.158	3.71	4.49	T=24
Fiscal	Tax Revenue	Overall	7.10	0.946	4.6	10.05	N=180
		Between		0.551	6.39	8.09	n= 8
		Within		0.786	4.98	9.77	T=22.5
	Non Tax	Overall	7.01	1.37	5.03	10.68	N=157
		Between		1.35	5.92	9.92	n= 7
		Within		0.491	5.63	7.87	T=22.5

#### 4. Results

Table 1.1 and Table 2.1 describe the summary statistics of major variables (property crime, GSDP per capita, social expenditure, industrial workers, C-D ratio, own tax and non-tax) in South-West and North-East regions. The mean of GSDP per capita in South West is 11.20, which is higher than that of North-East region (10.86). The mean industrial worker is higher in South-West compared to North-East while mean social expenditure is higher in North-East than South-West. The mean of C-D ratio of South-West and North-East are 4.14 and 3.36, respectively. Average C-D ratio indicates that South-West region is financially developed compared to North-East region. Mean of property crime are 3.76 and 3.61 in South-West and North-East region, respectively. It is noted that mean own tax is higher in South-West compared to North-East region while mean non-tax is nearly equal in both regions.

Table 1.2: Estimated results for Socio-Economic Determinants of Property crime in South-West Region

	M1	M2	M3	M4
	REM	REM	PA	PA
GDP per capita			-0.201*** (-4.47)	-0.293* (-1.70)
Industrial worker	-0.396*** (-4.79)	-0.250*** (-2.87)	-0.228*** (-2.63)	-0.222*** (-2.56)
Social Exp		-0.176*** (-4.01)		0.092 (0.56)
Cons	6.57*** (10.91)	7.01*** (11.90)	7.63*** (12.49)	7.88*** (10.48)
Wald statistics (p value)	22.93*** (0.000)	41.04*** (0.000)	47.23*** (0.000)	47.80*** (0.000)
Hausman test chi square (p value)	2.90* (0.08)	0.85 (0.65)		

Note: REM: Random Effect Model, PA: Population Average Model. t- values are in parenthesis. \*\*\*,\*\* and \* denotes 1%,5% and 10% level of significance, respectively.

Table 2.2: Estimated REM results for Socio-Economic Determinants of Property crime in North-East Region

	M1	M2	M3	M4
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GSDPPC				-0.453*** (-4.61)
Industrial worker		0.124*** (2.60)	0.203*** (4.43)	0.308*** (5.41)
Social Exp	-0.068** (-2.05)		-0.247*** (-4.33)	
Cons	4.22*** (11.40)	2.61*** (8.72)	4.35*** (8.81)	6.50*** (7.21)
Wald statistics (p value)	4.20** (0.04)	6.75*** (0.009)	28.53*** (0.000)	31.24*** (0.000)
Hausman test chi square (p value)	2.62 (0.10)	0.09 (0.76)	0.17 (0.91)	1.39 (0.49)

Note: t- values are in parenthesis. \*\*\*,\*\* and \* denotes 1%,5% and 10% level of significance, respectively.

Using cross-state panel data set on property crime rate and indicators of development, money market and fiscal instruments we examine and compare their relational variation between two regions. To be precise, initially we estimate the said relation for South-West region, and repeat it for the North- East region. Random effect model (REM) is accepted and adopted for analysis purpose as per Hausman  $\chi^2$  test suggestion. We have reported results mostly of random effect model (REM), however, some specific combination related results are also moderately significant in fixed effect model (FEM). Table 1.2 and Table 2.2 describe the impact of social and some development indicators on property crime in South-West and North-East regions respectively. Table 1.3 and Table 2.3 represent the impact of financial development and fiscal indicators on Property crime in South-West and North-East regions respectively. Table 1.2 and Table 2.2 show that social expenditure have negative impact on property crime in South-West and North-East regions. Industrial workers have positive impact on North-East and negative impact in South-West regions, respectively. Table 1.3 and Table 2.3 show that C-D ratio, Own tax, Non tax are negatively significant and reduce property crime in South-West region. C-D ratio and non-tax are insignificant in North-East region, however, only Own tax has negative impact on property crime in North-East region. Table A1.4 and Table A2.4 provide results of combinations of financial and socio-economic determining factors of property crime in South-West and North-East regions in India during 1994-2017.

Table 1.3: Results of REM for Financial and Fiscal Determinants of Property Crime in South-West Region

	M1	M2	M3	M4	M5
C-D ratio	-0.378*** (-3.48)		-0.015 (-0.11)		-0.022 (-0.16)
Own tax			-0.192*** (-3.59)	-0.218*** (-4.49)	-0.212*** (-3.53)
Non tax		-0.089* (-1.92)		0.043 (0.79)	-0.042 (-0.76)
Cons	5.32*** (11.35)	4.39*** (12.83)	5.48*** (12.17)	5.33*** (13.98)	5.38*** (11.48)
Wald statistics (p value)	12.10*** (0.000)	3.70** (0.05)	25.37*** (0.000)	25.64*** (0.000)	25.58*** (0.000)

Hausman test chi square (p value)	0.13 (0.71)	13.03*** (0.000)	2.98 (0.22)	4.77* (0.09)	11.70**** (0.0008)
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Note: t- values are in parenthesis. \*\*\*,\*\* and \* denotes 1%,5% and 10% level of significance, respectively.

Table 2.3: Results of REM for Financial and Fiscal Determinants of Property Crime in North –East Region

	M1	M2	M3	M4	M5	M6	M7
C-D ratio			0.015 (0.23)		0.114 (1.36)	0.094 (1.29)	0.087 (1.03)
OWN tax	-0.048* (-1.77)			-0.079** (-2.03)	-0.086** (-2.21)	-0.055** (-2.02)	
Non tax		-0.016 (-0.34)		0.024 (0.47)	0.013 (0.25)		-0.028 (-0.57)
cons	3.95*** (13.09)	3.65*** (8.58)	3.56*** (10.69)	3.92*** (8.52)	3.66*** (7.11)	3.68*** (9.67)	3.44*** (7.07)
Wald statistics (p value)	3.13* (0.07)	0.12 (0.73)	0.05 (0.81)	4.25 (0.11)	6.15 (0.10)	4.85* (0.08)	1.20 (0.55)
Hausman test chi square (p value)	0.15 (0.70)	0.21 (0.64)	0.13 (0.71)	0.10 (0.94)	0.13 (0.98)	0.09 (0.95)	0.29 (0.86)

Note: t- values are in parenthesis. \*\*\*,\*\* and \* denotes 1%,5% and 10% level of significance, respectively.

Table A1.4 displays the estimated results of possible (models) combinations of determining factors of South- West regions. Property crimes decline with rising GDP per capita. Literature supports this result (Ahmed et.al 2014, Cottpoveda 2014). Property crime falls due to increase in industrial workers. In other word, property crime reduces as industrial job increases along with raising urbanisation. So, industrialization is necessary for controlling crimes in South-West region. This result is similar in Japan (Tushima 1996). Social expenditure includes expenditure on education, health, sports, food security etc. Social expenditure is the proxy of human capital formation and social security. Result identified that more social expenditure leads to decline crime. Literature (Chakroborty 2012, Khan et.al 2015, CottPoveda 2012, Brink et al 2010) support this result. Own tax revenue in the income of the government decreases the property crime. Non-tax revenue income is the part of fine etc. Property crime declines with increasing fine and/or penalty etc. and as a result non-tax revenue improves. It suggests that more fine leads to lower property crime. C-D ratio is the proxy of financial development indicator. We can identify some models which represents C-D ratio may have negative impact on property crime. Property crime reduces with financial development.

Now we repeat the same exercise in the North East region. Table A2.4 provides the estimated results of North-East region for the period of 1994-2017. Table A2.4 shows the relationship between property crime and socioeconomic and financial indicators in the North East region. All models suggest that property crime falls with rising per capita GSDP. Industrial worker leads to higher property crime in North-East region and contradict to findings of South- West region. In other word, we may interpret it that low quality of industrial work or poor urbanization in North-East regions leads to more crime compared to South- West. This result is supported by existing literature (Soh 2012, Jalil et.al 2010, Sacerdote et al 1999). Social expenditure helps to reduce property crime. Social expenditure includes in health expenditure, education etc. Human capital formation and

social safety net have negative impact on property crime in North Eastern region. It is also observed that with increasing own tax and Non tax revenue, property crime falls for some situations. C-D ratio is insignificant in all models. It indicates that money market has not developed in North –East region, and it has no impact on property crime.

Now, we compare findings or results between North-East and South-West region (Table 3.1). Most of the model indicates REM in South-West region and all models under REM in North-East region. The coefficient of GDP per capita is negative and highly statistically significant. GDP per capita, one of the most important development indicators, plays a vital role to reduce property crime in both regions. The coefficients of industrial workers are statistically highly significant in both regions with opposite signs – positive in North-East and negative in South-West region. Industrial worker is associated with industrialization which can also be considered as a proxy of urbanization. In this context, South–West is better than North-East. Perhaps good job quality in South-West helps to reduce crime while possible poor quality of jobs (or low level of urbanisation) increases property crime in North- East region. It should be noted that significant difference between two regions is the C-D ratio, financial development indicator. The coefficient of C-D ratio is insignificant in all models in North-East while highly significant in some models in South-West region. Financial development(C-D ratio) helps to control the property crime in South- West; however, it is insignificant in North-East region. Own tax and Non- tax revenue both have negative impact on property crime in both regions respectively. Non- tax revenue is positively significant in presence of social expenditure in North-East region while it is insignificant in South-West. Social expenditure is negatively significant in both regions and is not taken for comparison.

Table 3.1: Comparative Analysis of Random Effect results of South-West and North-East regions during the period 1994-2017

	<i>property crime in South West region in India during 1994-2017</i>				<i>property crime in North East region in India during 1994-2017</i>			
	M1	M2	M3	M4	M1	M2	M3	M4
GSDPPC	-0.231*** (-3.59)				<b>-0.462***</b> <b>(-4.67)</b>			
Industrialization	-0.221** (-2.48)	-0.344*** (-4.11)		-0.366*** (-4.36)	<b>0.306***</b> <b>(5.33)</b>	<b>0.120**</b> <b>(2.48)</b>		<b>0.192***</b> <b>(3.76)</b>
C-D Ratio	0.098 (0.66)	<b>-0.276***</b> <b>(-2.56)</b>	-0.022 (-0.16)		0.073 (0.80)	0.059 (0.57)	0.114 (1.36)	
Own Tax			-0.212*** (-3.53)				-0.086** (-2.21)	
Non Tax			-0.042 (-0.76)	-0.081* (-1.78)			0.013 (0.25)	<b>-0.145**</b> <b>(-2.42)</b>
C	7.51*** (11.57)	7.35*** (11.07)	5.38*** (11.48)	6.93*** (10.78)	6.35*** (6.66)	2.42*** (5.48)	3.66*** (7.11)	3.22*** (7.94)

Note: z- values are in parenthesis. \*\*\*,\*\* and \* denotes 1%,5% and 10% level of significance, respectively.

## 5. Conclusion

This paper examines the relationship between property crime and economic development highlighting on financial and fiscal indicators. The study mainly focuses on such relational variation between two regions: South-West and North-East. Panel data set has

been constructed using property crime of NCRB and RBI financial data for the period of 1994-2017 for both regions in India. Applying panel data analysis technique this paper estimates several models for different combinations of determining factors of crime in the said regions for the period of 1994-2017. Result of Random Effect Model (REM) is accepted as per selection criteria.

This paper observes that economic development (GDP per capita) is crucial for reduction of crime in both regions. Impact of industrial workers on property crime is positively significant in North-East while it is negatively significant in South-West region. Desire employability might help to reduce crimes in developed area. Financial factor, C-D ratio, is significantly negative in South-West region only. North-East is financially less developed. In this context this study suggests that the Government should adopt appropriate policy for improvement of C-D ratio in North-East region. Financial development is important for creation of business opportunity which generates jobs, and in turn, it helps to reduce crimes. Property crime reduces with fiscal indicators own tax and non-tax revenue income of the government in both regions in India. Imposing fine and penalty are important component of non-tax revenue. Non-tax fiscal instrument needs to be strengthened at states and regional levels for controlling property crimes. Proper justice and punishment certainly minimise crimes in regional levels.

Property crime declines with rising social security associated social expenditure. Appropriate social security definitely reduces property crime in India. The Government should allocate more social expenditure for improvement of social security which definitely reduce property crime rate in India. The study suggests adopting effective fiscal actions for local government at regional levels.

This study has some limitations in terms of availability of qualitative data on governance, civil rights, rules of law, justice, law and order, etc. at local level or community level, particularly across block levels.

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## Appendix

Table A1.4: Results of REM for Social, Financial and Development indicators of  
Property Crime in South-West Region

	M1	M2	M3	M4	M5	M6	M7	M8
GDPPC	-0.286** (-2.01)	-0.237*** (-4.90)	-0.233*** (-4.21)	-0.231*** (-3.59)	-0.413** (-2.29)	-0.340** (-2.27)	-0.369** (-2.42)	-0.212*** (-3.75)
Industrial worker				-0.221** (-2.48)		-0.227*** (-2.57)	-0.222** (-2.51)	-0.218** (-2.42)
Social Exp					0.171 (1.02)			
Own tax	0.065 (0.48)					0.135 (0.98)	0.130 (0.93)	
Non tax		0.037 (0.72)						0.023 (0.43)
C-D			0.044 (0.32)	0.098 (0.66)	0.067 (0.47)		0.107 (0.71)	
Constant	6.41*** (10.83)	6.15*** (13.00)	6.19*** (12.50)	7.51*** (11.57)	6.69*** (9.56)	8.02*** (10.77)	7.92*** (10.07)	7.52*** (11.88)
Wald statistics (p value)	30.23*** (0.000)	29.47*** (0.000)	30.41*** (0.000)	45.86*** (0.000)	32.02*** (0.000)	46.04*** (0.000)	47.90*** (0.000)	43.46*** (0.000)
Hausman test chi square (p value)	2.79 (0.24)	3.78 (0.15)	4.40 (0.11)	6.23 (0.10)	5.36 (0.14)	4.33 (0.22)	5.41 (0.24)	5.51 (0.13)

	M9	M10	M11	M12	M13	M14	M15	M16
GDPPC								
Industrial worker	- 0.344*** (-4.11)	- 0.247*** (-2.73)	- 0.248*** (-2.80)	- 0.181*** (-3.09)	-0.254*** (-2.88)	-- 0.252*** (-2.82)	-0.246*** (-2.76)	- 0.256*** (-2.89)
Social Exp				- 0.253*** (-2.89)	-0.190 (-1.32)		-0.182*** (-2.79)	-0.195 (-1.35)
Own tax		- 0.171*** (-3.12)	- 0.163*** (-3.76)		0.013 (0.09)	-0.162*** (-2.74)		0.005 (0.03)
Non tax		-0.012 (-0.22)					0.020 (0.37)	
C-D	- 0.276*** (-2.56)			0.016 (0.11)		-0.003 (-0.02)	-0.019 (-0.14)	0.043 (0.28)
Constant	7.35*** (11.07)	6.89*** (10.91)	6.92*** (11.75)	7.01*** (10.57)	7.04*** (11.87)	6.96*** (10.36)	6.97*** (10.15)	6.99*** (10.29)
Wald statistics (p value)	30.60*** (0.000)	38.67*** (0.000)	38.45*** (0.000)	41.77*** (0.000)	41.65*** (0.000)	39.16*** (0.000)	40.000*** (0.000)	42.66*** (0.000)
Hausman test chi square (p value)	1.07 (0.58)	6.16 (0.10)	2.24 (0.32)	4.55 (0.20)	1.26 (0.73)	4.37 (0.22)	929* (0.05)	0.46 (0.97)



Note: t- values are in parenthesis. \*\*\*,\*\* and \* denotes 1%,5% and 10% level of significance, respectively.

TableA2.4: Results of REM for Social, Financial and Development indicators of Property Crime in North East region

Variables	M1	M2	M3	M4	M5	M6	M7	M8
GSDPPC	0.044 (0.62)	-0.105* (-1.71)	-0.462*** (-4.67)	-0.751*** (-3.17)	-0.438*** (-3.84)	-0.430*** (-3.73)		
Industrial worker			0.306*** (5.33)	0.294*** (5.11)	0.310*** (5.41)	0.310*** (5.37)	0.120** (2.48)	0.270*** (4.64)
Social Exp								
C-D ratio			0.073 (0.80)	0.101 (1.08)		0.0927 (0.96)	0.059 (0.57)	
Own tax	-0.077 (-1.41)			0.174 (1.37)				-0.165*** (-2.64)
Non Tax		0.004 (0.09)			-0.020 (-0.30)	-0.044 (-0.64)		-0.054 (-0.82)
Constant	3.68*** (6.95)	4.64*** (6.54)	6.35*** (6.66)	8.20*** (4.89)	6.46*** (6.97)	6.22*** (6.25)	2.42*** (5.48)	3.35*** (8.59)
Wald statistics (p value)	3.48 (0.17)	2.99 (0.22)	32.33*** (0.000)	33.92*** (0.000)	31.27*** (0.000)	32.99*** (0.000)	7.04** (0.02)	22.20*** (0.00)
Hausman test chi square (p value)	1.60 (0.45)	0.42 (0.80)	1.19 (0.75)	6.78 (0.14)	1.62 (0.65)	1.27 (0.86)	0.36 (0.86)	4.86 (0.18)

	M9	M10	M11	M12	M13	M14
GDPPC						
Industrial worker	0.192*** (3.76)	0.267*** (4.61)	0.200*** (4.28)	0.266*** (4.51)	0.193*** (3.76)	0.222*** (3.83)
Social Exp			-0.248*** (-4.30)			-0.213*** (-2.92)
C-D ratio			0.068 (0.74)	0.037 (0.39)	0.135 (1.35)	0.050 (0.53)
Own tax		-0.192*** (-3.53)		-0.193*** (-3.53)		-0.051 (-0.74)
Non Tax	-0.145** (-2.42)				-0.170*** (-2.72)	
Constant	3.22*** (7.94)	3.19*** (9.47)	4.13*** (7.17)	3.07*** (6.58)	2.93*** (6.09)	4.14*** (7.32)
Wald statistics (p value)	14.70*** (0.000)	21.83*** (0.000)	28.77*** (0.000)	22.30*** (0.000)	16.84*** (0.008)	29.80*** (0.000)
Hausman test chi square (p value)	0.59 (0.74)	1.45 (0.48)	0.30 (0.96)	0.77 (0.85)	0.93 (0.81)	8.09* (0.08)

Note: t- values are in parenthesis. \*\*\*,\*\* and \* denotes 1%,5% and 10% level of significance, respectively.