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ECONOMIC, DEMOGRAPHIC, DETERRENT VARIABLES AND CRIME RATE IN INDIA

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Abstract

Crime has plagued society since time immortal. The crime rate in India has been on rise, therefore, it becomes important to study the factors that impact the crime rate. The purpose of the paper is to investigate the relationship between various economic, demographic and deterrent factors and the crime rate in India. The study focuses on the extent of effects of various factors like population density, sex ratio, minority population, poverty, per capita income, no of police personnel and literacy rate on crime registered under IPC¹ in all Indian states and major union territories. The study covers the data of all the Indian states and major union territories of period 2011. The findings show that these factors are crucial determinants of the rate of the criminal cases registered in India.

Keywords: Crime per capita, Determinants

I. Introduction

Crime is an evil that affects everybody in a society. Therefore, it is important to study what incite people to commit a crime. From time immortal, it has plagued every society in human history. The history of crime is as old as the history of mankind. The first crime was committed by Cain, the first son of Adam and Eve when he murdered his brother Abel out of jealousy. (Gilani, Rehman, Gill, 2009)

Though there is no universal definition of the crime, Cruzel states that “A crime as an act or omission of human conduct harmful to others which the state is bound to prevent. It renders the deviant person liable to punishment as a result of proceedings initiated by the state organs assigned to ascertain the nature, the extent and the legal consequences of that person’s wrongness” (Auolak, 1999)

Gaviria and Pagés, 2002, Mathur, 1977, Stevans, 1983, Meera and Jayakumar, 1995, and Masih and Masih, 1996 states that there are basically three determinants of crime i.e. Economic, Demographic and Deterrent factors. Economic factors include per capita income, poverty level, GDP of the state, unemployment. All of these economic variables have either negative or positive impact in determining crime rate in a state.

Demographic variable includes Sex Ratio, Education level, no of schools in a state. We expect that all these demographic factors affect the crime rate in a state. Deterrent variables like probabilities of being arrested and convicted determine the expected returns from crime (Becker, 1968, Ehrlich, 1973, 1975, 1996,

Grogger, 1991). Since deterrent variables represent costs to criminal, we expect a negative relationship between deterrent variables and crime rate. Out of all the deterrent variables like robustness of legal system, police force, no of jails and no of courts in a state, we are considering only two variables i.e. no of jails and no of police personnel in a state because either the data on other variables aren't available or we can't measure it.

As per the data with NCRB, Kerala has the maximum per capita crime in India with 0.00516 cases per individual followed by Puducherry with 0.00351 cases registered per person under IPC. Nagaland has the least number of per capita cases registered in India.

Table 1: Rankings of state on the basis of per capita crime

| State | Per Capita IPC Crimes | State | Per Capita IPC Crimes | State | Per Capita IPC Crimes | State | Per Capita IPC Crimes | State | Per Capita IPC Crimes |
|----------------|-----------------------|-------------|-----------------------|--------------|-----------------------|-------------|-----------------------|-------------|-----------------------|
| Kerela | 0.00516 | Haryana | 0.0023958 | A & N Island | 0.002087 | West Bengal | 0.0015676 | Sikkim | 0.00098 |
| Punducherry | 0.00351 | Goa | 0.002366 | Gujarat | 0.002043 | Odisha | 0.0014608 | U.p | 0.00098 |
| Chandigarh | 0.00336 | Karnataka | 0.0022509 | Jammu | 0.001953 | Bihar | 0.0013092 | Meghalaya | 0.00093 |
| Delhi | 0.00318 | Andhra | 0.0022415 | Maharashtra | 0.001823 | Punjab | 0.0012591 | Daman & Diu | 0.00092 |
| Madhya Pradesh | 0.00299 | Chattisgarh | 0.0022403 | Mizoram | 0.001669 | Manipur | 0.0011823 | Uttarakhand | 0.00087 |
| Tamil Nadu | 0.00267 | Assam | 0.0021404 | Arunachal | 0.001653 | Jharkhand | 0.0010871 | Lakshwadeep | 0.00068 |
| Rajasthan | 0.00241 | H.P | 0.0020874 | Tripura | 0.001581 | D&N Haveli | 0.001085 | Nagaland | 0.00055 |

(Source: Crime in India 2012, National Crime Record Bureau, Ministry of Home Affairs)

This study will help in determining the variables that impact the number of crime in a state. There have been a number of studies in this area but none of them is focused on state wise data. Our paper is different from others because of the number of variables that we have taken into account and also that the data is state wise.

II. Review of literature

There have been a lot of studies to establish the relationship between the rate of crime and the factors affecting it. The results have helped us choose the variable that we took.

1. Gary Becker (1974) (Crime and Punishment: An Economic Approach) presented a model based on the cost of crime. He explained the economics of crime in terms of cost and benefits of a particular crime. He stated that cost of different punishments to an offender can be made comparable by converting them into their monetary equivalent or worth.
2. Dreze and Khera (2000) analyzed the effect of gender and demography on the crimes committed and reported in India. The authors stated that education has a moderate influence on the criminal

violence. Murder rate strongly correlates with sex ratio, where a higher sex ratio results into lower murder rate.

3. Gumus (2003) studied the effect of per capita income, income inequality, population, and presence of black population on the crime rate in the US and stated that these all are important determinants of the crime rate. Unemployment rate and police expenditures have also an impact on crime but not as much as other stated factors.
4. Dubey and Aggarwal (2015) state that political, economic and socio-cultural factors play a vital role in crime and crime control practices in India. They stated that the financial crisis and the current political stalemate in India have contributed to increasing crime rate.
5. Dutta and Husain (2009) investigated the impact of deterrent variables like police force & arrest rate and socio-economic variables like poverty & urbanization on crime in India. They concluded that deterrence is likely to have a significant negative impact on crime rates and economic growth is an important determinant of crime rates.

III. Crime Functions

Poverty level (% of people below poverty line): One of the most important reasons which may incite crime in human beings is their poor financial condition.

Literacy Rate: The literacy rate is an important variable that may help in determining the crime rate of a state. It is expected that more the literacy rate of a state, the less the crime would be. This is so because as the literacy rate of state increases, there will be less unemployed people and therefore they will not opt for illegal ways to get money. Though this may not be the case always because crime has more to do with psychological factors but a negative relationship can be expected in literacy rate and crime rate.

Net Enrolment Ratio (Upper Primary Level): In this case, it may be expected that more the enrolment rate, less the crime would be. The reason for this is similar to what literacy rate does in a state.

Per capita schools: No of schools in a state may be related to the education level of its residents. Though the number of people attending the schools is more important to relate it to the crime rate we can assume that more the number of schools, more the opportunity of education to its people.

Rural population: There might be a relationship between the number of people living in rural area² and crime rate. It may be expected that more the %age of the population living in rural areas, less the crime would be as the probability of getting caught in a rural area is more because there are fewer people in an area and they know each other well.

Sex Ratio: It can be said that a higher sex ratio (no of males to no of females), more the crime rate in a state. This may be because of the following reasons. More sex ratio may lead to more number of crimes if men are more prone to crime than women because of the maleness effect. Higher sex ratios mean that fewer men can be married, and marriage may discipline men (a civilizing effect) (Korenman & Neumark, 1991; Messner & Sampson, 1991; Barber, 2000; Sampson, Laub, & Wimer, 2006).

Household Availing bank services: There are not many studies about how the number of household availing bank services may affect crime rate in India but we expect that more the financial independence in a house, less the family members prone to commit a crime. One of the factors from which financial independence come is by having a bank account.

Population Density: It can be argued that more the number of people living in an area, higher are the chances that people will commit a crime. It is because, in a highly dense area, people fight for the limited resources and when they can't get hold of them, they choose the wrong ways to acquire them.

Per capita GSDP (Constant Price): Gross State Domestic product can be one of the factors which can affect the crime rate in both ways. If crime were a rational thing, we would expect the crime rate to go down if the GSDP is more i.e. if the state is rich enough. But it can have a negative relationship too as the criminals will have more chances to steal or a better reason to kidnap someone affluent.

Per Capita Income (Constant Price): It can be assumed that less the income of the people of a state, more the crimes would be.

Total police per lakh of the population(Actual): The robustness of judicial system can be measured by the no of police personnel. We have taken no of police personnel per thousand population. It can be argued that more the police force, less the crime would be. A negative relationship can be expected between the number of police personnel and the crime as the probability of getting caught is increased by more no of police.

No of jails: No of jails per capita is one of the determinants that tell the robustness of judicial system of a state. Therefore we can expect a negative relationship between number of jails and the crime rate.

Minority Population: We will take the % of minority population as one of the determinants of the crime rate. Though there is no previous study that is done on this topic with reference to India. But, there are studies in the US which postulate that because of increase in black population (minority population in the US) the crime rate increases. Glaeser and Sacerdote (1999: 8, 15, 24), (Grogger and Willis (2000), Krivo and Peterson (1996), Cullen and Levitt (1999)). Blumstein et al. (1986) state that fraction of blacks is an important predictor of crime. This is one of the reasons it's important to study the % of the minority population of a state.

IV. Limitations

This paper only covers the reported crime under IPC and neglects the ambit of total crime including unregistered crimes as data is not available on them. The problem is if police- recorded crime is higher in a region, it does not follow that actual crime is also higher (Vollaard and Hamed 2012). The absence of a direct link between crime and its recording by police also makes it difficult to determine what factors affect crime. But we have tried to find a correlation between a number of recorded IPC crimes and factors affecting them.

V. Methodology

The objective of the study is to find a relationship and effects of demographic, economic and deterrent variable on the crime rate of Indian states and major Union Territories through quantitative research using secondary data. We have obtained data on these variables from various sources like Census of India, 2011, Reserve Bank of India publications and National Crime Record Bureau Compendium. The data has 32 data points (28 states and 4 Union Territories). Data related to economic factors of three Union Territories in India is not calculated and computed by the agencies hence, data related to Lakshadweep, Dadar and Nagar Haveli and Daman and Diu wasn't taken into consideration for the analysis at all. We first calculated significance value(p) and Pearson correlation of all the variables that we took into account for our study. After performing p test and Pearson correlation test, we did a collinearity test to find the set of variables

which explains almost the same variability in the outcome and kept only one of those highly correlated variables. Finally, Linear Regression was performed to compute a general equation to estimate the future value of Per capita crime rate in India.

VI. Analysis

A correlation analysis was done on per capita IPC crimes (PCIPC), Population Density (PD), Sex Ratio (SR), Household Availing Bank Services (HABC), Minority population share (MN), Per Capita Schools (PCS), Rural Population (RP), Net Enrolment Ratio in upper primary school (NER), Police Per Lakh (PPL), Jails Per Capita (JPC), Literacy Rate (LR), Per Capita Income at constant price (PCI), Per Capita GSDP (PCGSDP) and Poverty Rate (PV) at 90% confidence level.

Table:2 Pearson Correlation and Significance Values

| | PCIDC Pearson Correlation | PCIDC Significance |
|---------------|--------------------------------------|-------------------------------|
| PD | .413 | .009 |
| SR | .245 | .089 |
| HABS | .333 | .081 |
| MN | -.336 | .030 |
| PCS | -.414 | .009 |
| RP | -.559 | .000 |
| NER | .150 | .207 |
| PPL | -.254 | .080 |
| JPC | -.059 | .374 |
| LR | .530 | .001 |
| PCI | .472 | .003 |
| PCGSDP | .447 | .005 |
| PV | -.140 | .222 |

The table shows that Population density, Sex Ratio, Household availing bank services, Net enrolment ratio in primary schools, Literacy rate, Per capita income and Per capita GSDP at a constant price are positively related to the Per capita crimes registered under IPC in India. An increase or decrease in any of these Independent variables will result into increase or decrease in the Per capita crime registered in India. On the other hand, Minority Population, Per Capita schools, Rural population, Police per lakh of population, jails per capita and poverty rate are negatively related to per capita crimes which means there is an indirect relationship and an increase in these variables will result into decrease in per capita crime in India. All the independent variables with P value of 0.1 or more will be rejected for further analysis as it signifies there is no relationship between independent variable and Per capita crime so the poverty rate, jails per capita and net enrolment ratio will not be considered for further analysis as the sig. is above 0.1.

Table 3: Descriptive Statistics

| | Mean | Std. Deviation | N |
|--------------------------------|------------|----------------|----|
| PerCapitalIPCCrimes | .001999424 | .000944491 | 32 |
| Populationdensity | 1043.844 | 2482.8457 | 32 |
| SexRatio | 943.313 | 53.4666 | 32 |
| HouseoldsAvailingbankservices | 61.469 | 16.1197 | 32 |
| Minority | .323709375 | .269192794 | 32 |
| PerCapitaSchools | .001443887 | .000832245 | 32 |
| RuralPopulation | .638229 | .2096126 | 32 |
| Totalpoliceperlakhofpopulation | 344.2859 | 311.69506 | 32 |
| PerCapitaGSDP | .005242773 | .003240036 | 32 |
| LiteracyRate | 69.1316 | 10.51754 | 32 |

Table 4: Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .774 ^a | .599 | .435 | .000709785 |

a. Predictors: (Constant), LiteracyRate, Minority, SexRatio, PerCapitaSchools, Populationdensity, HouseoldsAvailingbankservices, Totalpoliceperlakhofpopulation, PerCapitaGSDP, RuralPopulation

Table 5: Anova

ANOVA^a

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|----|-------------|-------|-------------------|
| 1 | Regression | .000 | 9 | .000 | 3.655 | .006 ^b |
| | Residual | .000 | 22 | .000 | | |
| | Total | .000 | 31 | | | |

a. Dependent Variable: PerCapitalPCCrimes

b. Predictors: (Constant), LiteracyRate, Minority, SexRatio, PerCapitaSchools, Populationdensity, HouseoldsAvailingbankservices, Totalpoliceperlakhofpopulation, PerCapitaGSDP, RuralPopulation

Table 6: Coefficients Table

Coefficients^a

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 90.0% Confidence Interval for B | |
|-------|--------------------------------------|-----------------------------|------------|---------------------------|--------|------|---------------------------------|-------------|
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound |
| 1 | (Constant) | -.004 | .004 | | -1.075 | .294 | -.011 | .002 |
| | Populationdensity | 9.001E-008 | .000 | .237 | .847 | .407 | .000 | .000 |
| | SexRatio | 6.352E-006 | .000 | .360 | 1.690 | .106 | .000 | .000 |
| | HouseoldsAvailingbankservices | 1.076E-005 | .000 | .184 | .875 | .392 | .000 | .000 |
| | Minority | .000 | .001 | -.026 | -.126 | .901 | -.001 | .001 |
| | PerCapitaSchools | -.152 | .205 | -.134 | -.739 | .468 | -.505 | .202 |
| | RuralPopulation | -.002 | .002 | -.417 | -.976 | .340 | -.005 | .001 |
| | TotalpoliceperlakhofpopulationActual | .000 | .000 | -.270 | -1.343 | .194 | .000 | .000 |
| | LiteracyRate | 2.415E-005 | .000 | .269 | .955 | .350 | .000 | .000 |
| | PerCapitalIncomeConstantprice | .000 | .000 | -.591 | -.924 | .366 | .000 | .000 |
| | PerCapitaGSDP | .090 | .177 | .310 | .509 | .616 | -.215 | .395 |

a. Dependent Variable: PerCapitalPCCrimes

A multi collinearity test was performed prior to linear regression and collinearity was found between per capita income and per capita GSDP hence, per capita GSDP was rejected for the further calculations of linear regression.

The value of mean and std. deviations in Table 3 reflects the average of all the variables and it can be inferred that there is no uniformity among states in terms of population density, police per lakh of population and minority population.

The value of R in Table 4 indicates the relationship between the combination of variables and the dependent variable. 0.774 clearly shows that there's a high degree of relationship between the independent variables and the number of cases registered under IPC in India. Adjusted R is 0.435 which clearly means that 43.5% of the dependent variable i.e. per capita crime can be explained by independent variables.

The Table no 5 shows that the independent variables statistically significantly predict the dependent variable, $F(9, 22) = 3.655$, $p = 0.006$ indicates that it's a good fit and, overall, the regression model statistically significantly predicts the outcome variable.

In Table 6 unstandardized coefficient represents how Per Capita IPC Crimes varies because of an independent variable when all the other variables are kept constant. The general equation to predict the per capita IPC crimes can be derived from the B values.

$$Y = -0.004 + 9.002(\text{Population Density}) + 6.352(\text{Sex Ratio}) + 1.076(\% \text{ of household availing bank services}) - 0.152(\text{Schools Per Capita}) + 2.415(\text{Literacy Rate}) - 0.02(\text{Rural Population}) + 0.09(\text{Per Capita GSDP})$$

B values also clearly distinguish the variables with a stronger impact on per capita crimes from variables with a relatively weaker relationship. A higher **B** value represents a stronger effect on per capita crime because of an independent variable.

VII. Conclusion

The study focused on the prevailing crime rate in India including all its states and union territories. It can be concluded that Kerala has the highest crime rate whereas Nagaland has the minimum crime rate in India.

The analysis reflects a fairly strong relationship between Population density, Sex ratio and Literacy Rate and Per capita crime under IPC in India and these factors play an utmost important role in determining the crime rate. Factors like Per capita gross state domestic product and per capita schools form a relationship with per capita crime but don't effect it by a large margin. Rural population share and minority population play a very negligible role in determining the criminal cases registered in India

VIII. Recommendations:

1. To keep check on the crime rate in India; Population density, Sex ratio and Literacy Rate are needed to be adequately addressed by the policy makers.
2. Rather than just opening schools (increasing per capita number of schools), the policy makers need to make sure that people are attending schools (increasing literacy rate). As per the results, literacy has an impact on curbing the crime rate and not per capita Schools.

3. The policy makers of Kerala need to pay attention to the reasons for crime rate as it has the maximum per capita crime among all the states and UTs of India.

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End notes

¹The Indian Penal Code (IPC) is the main criminal code of India. It is a comprehensive code intended to cover all substantive aspects of criminal law

²The "rural sector" means any place as per the latest census which meets the following criteria,

- A population of less than 5,000
- Density of population less than 400 per sq km and
- more than "25 per cent of the male working population" is engage in agricultural practices.

Source(<http://www.archive.india.gov.in/citizen/graminbharat/graminbharat.php>)