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THE IMPACT OF EXPENDITURE INEQUALITY AND SOCIOECONOMIC ON CRIME RATES IN INDONESIA. CROSS SECTIONAL STUDY USING SPATIAL ECONOMETRICS AND GEOGRAPHICALLY WEIGHTED REGRESSION

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ABSTRACT

Social disorganization theory has indicated that socioeconomic have a negative impact on crime. In contrast to the study literature, Indonesia data showed that increasing in economic growth and decreasing in poverty and unemployment rates lead to higher crime rates. Based on previous literature, we hypotized this issue due to the increasing expenditure inequality in Indonesia. While majority of literatures used Gini ratio, we utilized Gini, Palma, and Decile dispersion ratio as an indicator of expenditure inequality. We attempts to used victimization data survey from SUSENAS, while the most of part of research of crime in Indonesia are used police reported data. Using cross-section data at district level in Indonesia in 2015, we employ the spatial econometrics method and geographically weighted regression (GWR) to (1) capture the relationship between inequality and socioeconomic on crime rates, (2) evaluate the impact of spatial dependence on crime rates, and (3) explore spatial heterogeneity in association between inequality and socioeconomic on crime rates. This study used 3 types of crime rates (total, property and violent crime rates) as the dependent variable and median expenditure percapita, unemployment, poverty, density and expenditure inequality as independent variables. The results suggest that crime is one of negative externalities of the economy. The regression analysis revealed that poverty and unemployment do not affect robust to crime rates, hence poverty and unemployment are not the main factors in causing crime in Indonesia. Furthermore, the results of regression analysis showed that Inequality has a significant positive effect on all types of crime rates, and the GWR regression result indicated that inequality has a positive effect on criminality in all districts. Therefore, among other variables used in this study, inequality is considered as the main factor causing criminality in Indonesia.

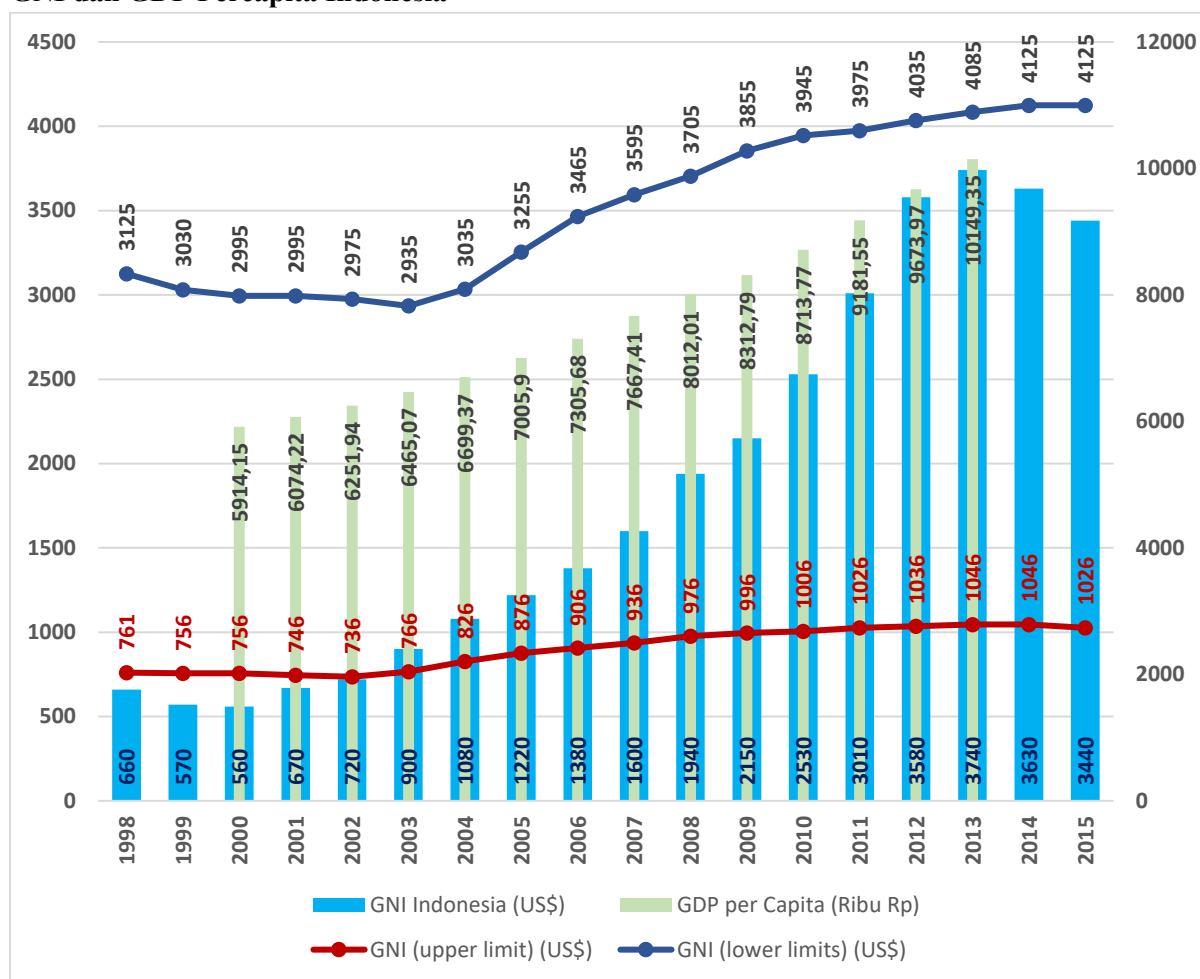
Keyword: crime, socioeconomic, expenditure inequality, spatial econometric, geographically weighted regression, spatial dependence, spatial heterogeneity

1. INTRODUCTION

Research Problem

After being released from the crisis in 1997-1998, Indonesia since 2003 has changed from a low income country to a middle income country. The GNI indicator changed from US \$ 720 in 2002 to US \$ 9,000 in 2003. In 2003, the GNI Perkapita Indonesia indicator was above the GNI standard for middle income country issued by the World Bank in the amount of US \$ 766, and continued to be above the minimum standard value until 2013. Therefore, since 2003 until the current period Indonesia is categorized as a middle income country (World Bank). In addition, the increase in people's income in Indonesia is also shown by changes in GDP per capita. The Central Statistics Bureau (BPS) reported that per capita GDP in Indonesia continued to increase from Rp. 5,914,150 in 2000 to Rp. 10,149,350 in 2013 (BPS). This change shows an increase in the welfare of the Indonesian people.

Figure 1
GNI dan GDP Percapita Indonesia



Source: Authors' calculations based on data from Indonesia Central Bureau of Statistics and World Bank

Apart from the income side, the social conditions of the Indonesian people also increased. The publication of the Central Statistics Bureau shows that the percentage of poor people in Indonesia has decreased. This can be seen in Figure 1 in Graph 2.2, where the graph shows that poverty rate fell from 14.6 percent in 2000 to 8.52 percent in 2013. The Central Bureau of Statistics also stated that the unemployment rate in Indonesia was reduced from 11.24 percent in 2005 to 6.17 percent in 2013.

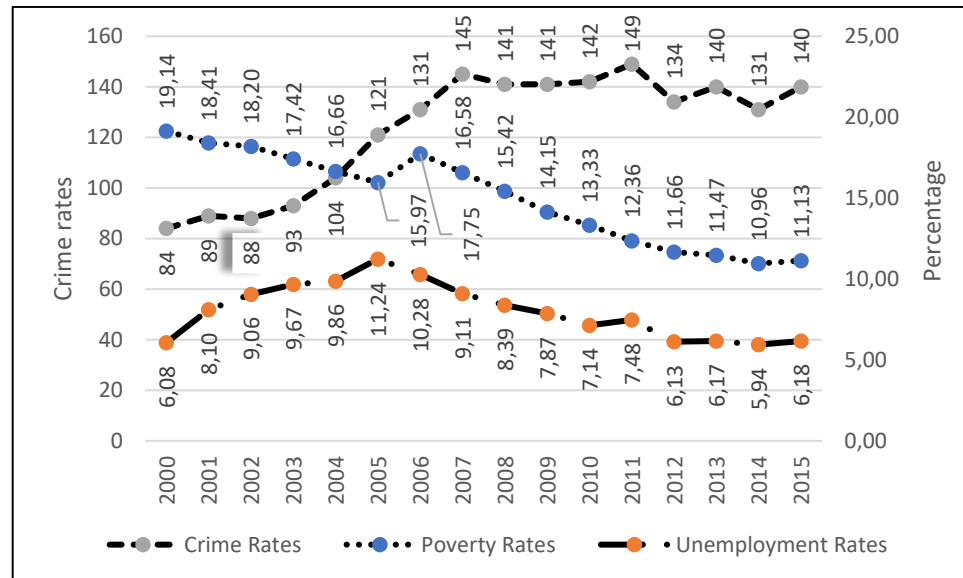
An increase in income, a decrease in poverty rate and an unemployment rate shows that the socioeconomic conditions in Indonesia are moving towards a better direction. Literature study states that improved in socioeconomic conditions should reduce crime rates (Anderson, 2006 and Cohen & Felson, 1979). However, data in Indonesia shows contradictions. The Central Bureau of Statistics reports that during the last thirteen years, crime rates in Indonesia have increased. Graph 2.3 illustrates that the crime rate increased from 84 per 100,000 population in 2000 to 140 per 100,000 population in 2013.

Improving socioeconomic conditions in Indonesia does not mean without other problems. Sudarlan et al (2015) argued that the increase in income in Indonesia was not evenly distributed, in other words the increase in income was not accompanied by equalization. Yusuf et al (2013) concluded that inequality of expenditure in Indonesia has increased. This can be seen in Graph 1.3 where inequality increased from 0.36 in 1993 to 0.41 in 2013. Graph 1.4 shows the positive relationship between

expenditure inequality (Gini Ratio) and the level of crime at the district level in Indonesia in 2015. Districts with high levels of expenditure inequality have a high crime rate. Therefore, we hypothesize that income inequality or expenditure inequality have a strong role in influencing crime rates in Indonesia.

Figure 2

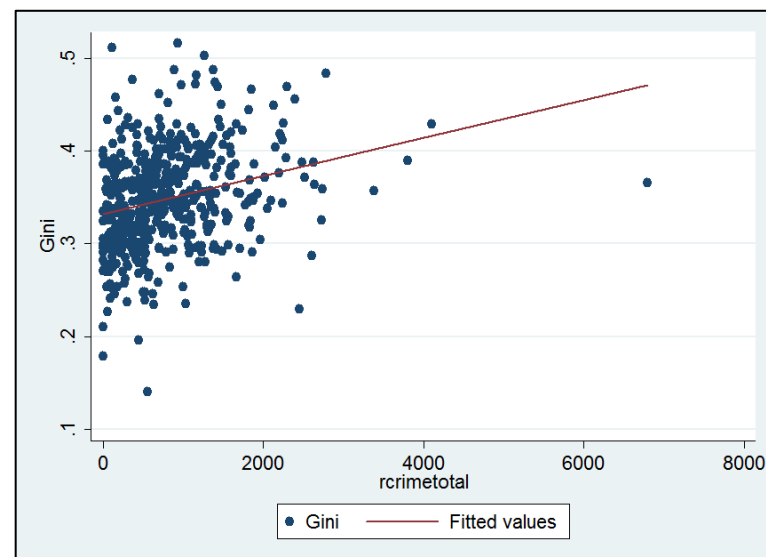
Poverty rate, Unemployment Rate, and Crime Rate in Indonesia



Source: Authors' calculations based on data from Indonesia Central Bureau of Statistics

Figure 3

The Relationship between Gini Inequality and Crime Rates in Indonesia



Source: Authors' calculations based on data from the National Socio-economic Survey (Susenas).

Study Literature

There are several theories that are often used in explaining crime both at the individual level and by region, namely Social Disorganization Theory (Shaw & Mckay, 1942), Strain Theory (Merton,

1938), Social Control Theory (Travis Hirschi, 1969), and Routine Activity theory (Cohen & Felson, 1979).

Porter & Purser (2010); Anderson (2006); and Kelly (2000) argue that there are four indicators of social disorganization theory that influence the level of crime in an area: socioeconomic conditions, family distortion, urbanization and racial diversity. Socioeconomic conditions has a negative impact on crime rates. When socioeconomic conditions in an area improve, the crime rate in the region will decrease (Sampson & Groves, 1989). Sampson (1986), Porter & Purser (2010), Hooghe et al (2010), Guilherme & Soares (2009) employ income, education, poverty, unemployment, income inequality, per capita GDP, and home ownership as variables that describe socioeconomic conditions in a region. Sampson (1986), Kelly (2000), and Porter & Purser (2010) argue that family disruption has a positive impact on crime rates. Areas with a high percentage of divorced population tend to have a high crime rate. Sampson (1986), Hooghe et al (2010), and Porter & Purser (2010) use indicators of population density to describe the process of urbanization. High population density reduces the habit of residents of an area to maintain surveillance and provide protection (guardianship). This will further increase the number of victims of crime. Kelly (2000) uses an indicator of the percentage of black population and argues that the feeling of despair in the black population tends to be and the level of economic success is low, making the black population more likely to commit crime. The point is that racial heterogeneity has a positive impact on crime rates (Kelly, 2000 and Sampson & Groves, 1989).

Merton (1938) developed a strain of theory in the United States during the Great Depression. The strain referred to in this theory is the pressure in the form of a person's inability to meet financial goals. People in low economic circles tend to have obstacles to achieving financial goals. Children from the lower classes tend to attend low-quality schools, and often do not have the funds to go to higher education or to start a business. These obstacles cause frustration and ultimately tend to commit crimes to generate income, such as theft, drug sales, or prostitution (Robert Agnew, 2012).

Strain theory states that when a person is under pressure or stress, they have tendency to commit crime. Crime is one way to reduce or release pressure. According to the strain theory, pressure can be caused by the inability to achieve a goal (financial or status goals), loss of a positive stimulus (death of a friend or loss of something valuable), or a state of negative stimulus (verbal or physical violence experienced) (Miller, 2009). Agnew (2012) argues that strain theory has a major impact on public policy and as an inspiration to reduce poverty and inequality.

Routine Activity Theory was first developed by Cohen & Felson (1979). The beginnings of this theory questioned "*Why does the level of crime in urban USA from 1960 to 1975 increase?*" This happens in various types of crimes such as robbery, aggravated assault, rape and homicide. At the same time the socioeconomic conditions of urban communities in the USA have improved towards a better direction. Cohen & Felson (1979) found a contradiction with previous theories, where there was a positive relationship between socioeconomic conditions and the level of criminality caused by changes or structural differences in routine activities in the community. Cohen & Felson (1979) states that crime occurs when three elements (Motivated offenders, Suitable Target, and Absence of capable guardians) meet at the same time and place.

Cohen & Felson (1979) stated that during the period 1960-1970, per capita expenditure to purchase goods other than food (vehicles, electronics, etc.) had increased and showed an increase in Suitable Target. In addition, the level of labor participation of married women has increased and added "The absence of capable guardians" and "Suitable Target". Female residents who work tend to leave their homes not well maintained. This then increases the opportunity or opportunity for a crime in the form of theft. Both of these examples will ultimately increase crime rates. Anderson (2006) applies this theory to examine the relationship between demographic conditions and socioeconomic conditions on crime

rates in Vancouver, Canada. Using cross-section data in 1996, the research shows that family income has a positive effect on crime rates.

- Income

Social Disorganization Theory, Routine Activity Theory, and Strains Theory states that one of the factors that influence the high level of crime in an area is the level of income of people in the region (Anderson, 2006 and Agnew, 1999). Previous studies have shown inconsistent results in explaining the effect of income levels on crime rates. Hooghe et al (2010), Menezes et al (2013), Porter & Purser (2010), Engelen et al (2015) stated that income has a negative effect on crime rates. Agnew (2012), Intyre & Lacombe (2012), and Porter & Purser (2010) concluded that people in low economic circles tend to have obstacles to achieving financial goals and committing crimes. Ceccato & Dolmen (2011), Brush (2007), Doyle et al (1999), Khan et al (2015), Anderson (2006), stated a positive relationship between income level and crime rate due to an increase in household income representing an increase in routine activity and increase the potential to be a target of crime and reduce protection.

- Unemployment

Ceccato & Dolmen (2011), Porter & Purser (2010), Brush (2007), Hooghe et al (2010), Engelen et al (2015) argue that the unemployment rate has a positive effect on crime rates. Marc Hooghe, Bram Vanhauhte, Win Hardyns, and Turban Birgan (2010) argue that high levels of unemployment in an area cause social alienation and feelings of envy. Unemployment tends to have a higher probability of illegal activities or criminal acts.

- Poverty

Literature studies on the relationship between poverty and crime rates show ambiguous results. Khan et al (2015), Gillani et al (2009), Meloni (2014), Choe (2012), Engelen et al (2015) concluded that poverty has a positive effect on crime rates. People in poor conditions have a higher tendency to take illegal actions (Sampson & Groves, 1989). Nabela et al (2015) argues that poor people have limitations to meet needs and wants. On the other hand, Brush (2007) Porter & Purser (2010), Allen (1996), Khan et al (2015), Kelly (2000) reported that poverty has a negative impact on crime rates.

- Density

Snowden & Freiburger (2015), Baller et al (2001), Porter & Purser (2010), Brush (2007), Kelly (2000) state that population density has a positive effect on the level of crime. Sampson (1986) states that high population density reduces surveillance and guardianship, which in turn increases the number of crime victims.

- Inequality

Puech (2004), Scorzafave & Soares (2009), and Menezes et al (2013) show that income inequality has a positive effect on crime rates. Neckerman & Torche (2007) argue that the high level of income inequality in society causes hatred, jealousy and anger. Communities with low income tend to be jealous of people with high incomes. This social jealousy will eventually lead to criminal acts.

Choe (2012), Allen (1996), Fajnzylber et al (2002), and Chintrakarn & Herzer (2012) show that both the Gini and Decile Dispersion Index both have a negative effect on crime rates. Chintrakarn & Herzer (2012) and Demombynesa & Ozler (2005) argue that an increase in income inequality affects the increasing demand for protection from criminal acts (i.e protective dog and alarm system with armed

security response). Allen (1996) states that rich people tend to be able to apply an effective defense strategy to avoid crime.

Section two consists of data selection and research methodology that we arrange to answer the hypothesis. The fourth section shows the results of the study, and the fifth section explains the conclusions.

2. METHOD

2.1 Data

This study analyzed 497 regencies or all regencies in Indonesia in 2015. Map and coordination data used in this study were 2010 data published by the statistics center bureau.

This paper calculates three types of crime as dependent variables: Total crime rates, Property Crime rates, and Violent Crime Rates. Crime rates described as the number of victimizations per 100,000 population and calculated from Indonesia National Socioeconomic Survey or SUSENAS Individual KOR, March 2015. The crime survey data used is based on 2 premises. First, the crime rates published by the National Police contain unreported crime or crimes that are not reported to the police. This is due to the high reluctance of the public to report, meaning that actual crime will be greater than reported (BPS). The actual number of victims cannot be fully described by the data, but only shows the number of victims who reported crime to the police (Scorzafave & Soares, 2009, Glaeser & Sacerdote, 1999, Farrington & Jolliffe, 2005, Cohen et al, 1980, and Shicor et al, 1979). Second, the central statistics bureau and the National Police publish criminal data only at the provincial level, while this study analyzes at the district level.

Independent variables used are expenditure inequality, and per capita expenditure level, unemployment rate, poverty rate, and population density as a socioeconomic indicator.

- *Expenditure inequality*

This study calculates 3 variables to indicated expenditure inequality namely, Gini Ratio, Decil Dispersion Ratio, and Palma Ratio which are calculated from SUSENAS in March 2015. Calculation of inequality carried out in this study shows expenditure inequality. Akita & Lukman (1999), Sagala et al (2013), Yusuf et al (2013), and Leigh & Eng (2009) state that the measurement of inequality based on expenditure is more equitable than income-based measures, so that the value of expenditure inequality tends to be lower than the income inequality, and for developing countries, expenditure data is more reliable than income data.

The Gini Ratio is between 0 and 1, the higher the value of the Gini index means the higher inequality, and vice versa. Decil Dispersion Ratio is the ratio of the average consumption (or income) of the richest 10% of the population to the average consumption (or income) of the poorest 10% of the population. Palma ratio is the ratio of the division between the income of the richest 10% of the population and the income of the poorest 40% (Yusuf et al, 2013). There is no maximum limit for this index. If the index value is 0.25 this shows perfect equality. If the index value is 2, then it means that 10% of the richest group enjoys twice the share of national income compared to 40% of the poorest groups.

- *Socioeconomic*

There are many indicators to show the level of income or expenditure of people in an area. Menezes et al (2013) used the indicator of average income per capita, Khan et al (2015) using per capita GDP, Hooghe et al (2010), Engelen et al (2015), and Brush (2007) using Median Income as an indicator of community income in an area. We uses the median of per capita

expenditure as an indicator of income or expenditure level of the community in a region, calculated from SUSENAS March 2015.

The poverty variables used in this study refer to Porter & Purser (2010). The poor are the number of people with income below the poverty line. BPS uses the concept of the ability to meet basic needs in measuring poverty. With this approach, poverty is seen as an economic inability to meet basic food and non-food needs measured in terms of expenditure. The population under these conditions is called the number of poor people. In this study poverty is indicated by the percentage of people who lives below poverty line or poverty rates, calculated by BPS from SUSENAS in March 2015.

The concept of unemployment used in this study refers to several studies such as Porter & Purser (2010); Hooghe et al (2010); and Khan et al (2015). While the indicator that used in this study is Unemployment Rate. Unemployment rate shows the percentage of the number of unemployed to the total workforce.

Lastly, population density variable used as an indicator of urbanization. This variable is calculated by dividing the population by the area. Data obtained from BPS publications.

Table 1 describes descriptive data on each variable that we used in this study. The number of observations used in this study were 396 districts in Indonesia. The three crime rate variables are calculated to show the number of victims per 100,000 population. To show the income level, we calculate the median of per capita expenditure calculated in natural logarithms. Unemployment and Poverty are calculated as percentages. Gini variables used to indicate inequality are calculated in the form of indexes, while palms and decils are in the ratio. Population density represent the ratio of population per unit area.

Table 1
Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
TOT_CR	496	1343.973	1132.68	.3992048	12822.47
PRO_CR	496	1153.694	1009.033	.3992048	12822.47
VIO_CR	496	51.5242	148.4073	.0299021	2506.25
ln_TOT_CR	496	6.851974	1.083472	-.9182807	9.458955
ln_PRO_CR	496	6.676756	1.131055	-.9182807	9.458955
ln_VIO_CR	496	1.174588	2.853675	-3.509827	7.826543
EXP	496	623440.2	198799.7	244231.3	1435036
ln_EXP	496	13.29628	.3027332	12.40587	14.1767
POVERTY	496	13.35269	8.202522	1.69	45.74
TPT	496	5.319355	3.272151	.1	19.34
DENSITY	496	1126.897	2669.275	.8739433	19715.41
ln_DENSITY	496	5.265537	1.967168	-.1347397	9.889156
GINI	496	.3517998	.0499308	.1811588	.5092319
PALMA	496	1.50074	.3869693	.6789643	3.234363
DECILE	496	8.576906	2.591093	3.190486	21.77398

Source: Authors' calculation using Stata 13

2.2 Method

This study employed spatial econometrics approach and Geographically Weighted Regression (GWR). The spatial econometric approach is used to control the existence of spatial dependencies that occur when analyzing crime based on the region, while GWR is prepared to detect spatial heterogeneity in the relationship between inequality and socioeconomics to crime rates.

Spatial Econometrics

Tobler First Law of geography states "everything is related to everything else, but near things are more related than distant things" (Tobler, 1970). Baller et al (2001) and Light & Harris (2012) apply Tobler First Law of geography to explain criminal behavior. They argue that the level of crime in an area is strongly influenced by the level of crime in the surrounding area. Previous studies showed the existence of spatial dependence on various types of crime. Porter & Purser (2010) using queen contiguity weight matrix and spatial error model, shows the existence of spatial dependence on crime rates. Scorzafave & Soares (2009) utilizing distance weight matrix in spatial lag and spatial error models, indicating the existence of spatial dependence in pecuniary crime rates. Hooghe et al (2010) calculates queen contiguity weight matrix in Spatial lag models and Spatial error model states that there is spatial dependence in both types of crime, namely violent and property crime.

Ceccato & Dolmen (2011), Menezes et al (2013), Cracolici & Uberti (2009), Light & Harris (2012), Baller et al (2001), and Snowden & Freiburger (2015) state that there are spatial autocorrelations in various kinds crime and in various countries. Therefore, it is important not to ignore the spatial dependence factor when analyzing crime rate.

The first step in spatial econometrics is run OLS regression. The purpose of the OLS is to solve problems in linear regression, such as multicollinearity and heteroscedasticity. The model and data contained in this study do not contain the presence of multicollinearity and robust standard error is used to avoid heteroscedasticity. Furthermore, composing spatial weight matrix. Spatial autocorrelation expressed in the form of spatial weight matrix (W) and divided into two term. The first is spatial contiguity weighth matrix and the second is spatial distance weighth matrix (Anselin, 2005). This study applies spatial inverse distance weight matrix and the results of the calculation are attached to the table below:

Table 2
Spatial Invers Distance Weight Matrix

```
The following matrices have been created:

1. Inverse distance weights matrix W50 (row-standardized)
   Dimension: 496x496
   Distance band: 0 < d <= 50
   Friction parameter: 1
   Minimum distance: 0.0
   1st quartile distance: 6.9
   Median distance: 12.1
   3rd quartile distance: 19.0
   Maximum distance: 46.6
   Largest minimum distance: 2.78
   Smallest maximum distance: 23.70

2. Eigenvalues matrix E
   Dimension: 496x1
```

Source: Authors' calculation using Stata 13

Spatial inverse distance weight matrix was chosen because when the analysis was carried out using contiguity spatial weight matrix, the calculation results from moran's I became insignificant. This means that there is no spatial dependence in the research model.

Table 3
Moran's I, LM test, and Robust LM Test

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Moran's I	3.762 (0.000)	3.677 (0.000)	5.269 (0.000)	3.817 (0.000)	3.713 (0.000)	5.342 (0.000)	3.889 (0.000)	3.748 (0.000)	5.211 (0.000)
Spatial Error LM	7.240 (0.007)	6.852 (0.009)	15.867 (0.000)	7.506 (0.006)	7.028 (0.008)	16.390 (0.000)	7.775 (0.005)	7.119 (0.008)	15.371 (0.000)
Robust LM	2.783 (0.095)	3.524 (0.060)	11.185 (0.001)	3.059 (0.080)	3.737 (0.053)	10.890 (0.001)	3.136 (0.077)	3.717 (0.054)	10.535 (0.001)
Spatial Lag LM	4.775 (0.029)	4.207 (0.040)	23.852 (0.000)	4.844 (0.028)	4.260 (0.039)	24.277 (0.000)	5.046 (0.025)	4.347 (0.037)	23.196 (0.000)
Robust LM	0.319 (0.572)	0.880 (0.348)	19.170 (0.000)	0.396 (0.529)	0.969 (0.325)	18.777 (0.000)	0.407 (0.524)	0.945 (0.331)	18.360 (0.000)
p-values in parentheses									

Source: Authors' calculation using Stata 13

The results of Moran's I test in table 3 show that each model contains spatial dependence which is shown by the probability value less than the level of significance (5%). Furthermore, the LM test and Robust LM test are conducted to select the spatial model to be used. The results of the test are as follows:

- Model 1, 2, 4, 5, 7, 8 → Spatial Error Model
- Model 3, 6, 9 → Spatial Lag Model

Geographically Weighted Regression

This method used to test the consistency of relationships between variables. The existence of spatial heterogeneity in the relationship between an independent and the dependent variable indicates that the effect varies between regions. This study only analyzed the first model with this method. Fotheringham et al (2002) shows that the Geographically Weighted Regression (GWR) Model can be written as follows:

$$Y_i = \beta_0(u_i, v_i) + \sum_{k=1}^p \beta_k(u_i, v_i) X_{ik} + \epsilon_i$$

$$\hat{\beta}(u_i, v_i) = (X^T W(u_i, v_i) X)^{-1} X^T(u_i, v_i) Y$$

Y_i is dependent variable at the location of the i-observation location. X_{ik} is the independent variable to the k at the location of the i-observation location. u_i, v_i is the coordinates of the location of the observation point-i (longitude, latitude). $\beta_0(u_i, v_i)$ is constants or intercepts at the point of observation location i. $\beta_k(u_i, v_i)$ is coefficient at the location point of the i-observation. W is a diagonal matrix ($n \times n$) with each diagonal element being the weight for each observation location point (u_i, v_i) or w_{ij} . The weighting matrix at the location point i is $W(u_i, v_i)$ is written as follows:

$$W(u_i, v_i) = \begin{bmatrix} w_{i1} & 0 & \cdots & 0 \\ 0 & w_{i2} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & w_{in} \end{bmatrix}$$

Weight matrix in GWR serves to determine or estimate different parameters at each point of observation location. The function used for weighting in the GWR method is kernel function (Fotheringham et al, 2002). There are four types of weight matrix calculations in the GWR method, namely: Fixed Gaussian, Fixed Bisquare, Adaptive Bisquare, Adaptive Gaussian. The kernel type chosen in this study is Adaptive bi-square, which has the smallest AIC and AICc values among other

Kernels. Since, One way to determine which weighting matrix is used in GWR regression by comparing the AIC values on the GWR regression results. (Fotheringham et al, 2002).

$$w_{ij} = \begin{cases} (1 - d_{ij}^2/\theta_{i(k)}^2)^2, & \text{if } d_{ij} < \theta_{i(k)} \\ 0 & \text{if } d_{ij} > \theta_{i(k)} \end{cases} \text{ where } d_{ij} = \sqrt{(u_i - u_j)^2 + (v_i - v_j)^2}$$

d_i is the euclidean distance between i and j , $\theta_{i(k)}$ is adaptive bandwidth size defined as the k th nearest neighbour distance. In calculating the weight matrix, it is necessary to know the bandwidth parameter which is a radius of a circle. If a location point is within the radius of the circle, then it is considered to have an influence on the estimator of the regression coefficient at the location point- i . We use the Golden Section method to find the optimum bandwidth that has the smallest AIC (Fotheringham et al, 2002)

4. RESULT

The results of econometric spatial analysis can be seen in the table 4. The results of the analysis show that expenditure inequality, which is shown by the variables Gini, palma, and decile, has a significant positive effect on crime rates both in total, property, and violent crime rate. These results are consistent with previous studies, such as Puech (2004), Scorzafave & Soares (2009), and Menezes et al (2013). Areas with high expenditure inequality tend to have high crime rates. By applying the Deprivation theory of Neckerman & Torche (2007) assumes that high levels of inequality will lead to feelings of aversion, jealousy and anger among groups with low levels of resources. This social jealousy will eventually lead to violence. Moreover, poor people tend to commit violence in places where the level of inequality is high compared to places that have low inequality (Kelly, 2000).

The median expenditure per capita variable has a significant positive effect only on total and property crime rates. This result is in line with Ceccato & Dolmen (2011), Doyle et al (1999), and Brush (2007).

Khan et al (2015) and Cohen & Felson (1979) state that an increase in income in a region shows that the increase in property in the area causes a large number of property and perpetrators of theft and robbery. Furthermore, based on descriptive statistical data, the most types of crime in contributing to the total number of crimes in Indonesia are property crime rates. Therefore, when the expenditure variable has a positive and significant influence on property crime rates, the effect will also be the same as the total crime rates. However, the results show that the expenditure variable has no significant effect on violent crime rates. These results support the research of Doyle et al (1999). Doyle et al (1999) assume that economic reasons tend to motivate people to commit crimes with financial goals, such as to earn income, not for violent purposes.

Poverty has a significant positive effect only on violent crime, but there is no significant effect on total and property crime. This supports to Meloni (2014), Choe (2012), and Engelen et al (2015). The structural consequences of poverty cause frustration which can then lead to behaviors associated with violence (Webster & Kingston, 2014). Braithwaite (1991) shows that poor people tend to commit violence as an expression because of a feeling of being insulted by financial factors. Furthermore, these people feel they have the right to embarrass their victims. Based on empirical studies the poor tend to commit property crime for economic reasons (Khan et al 2015 and Sampson & Groves, 1989). In this research model, economic needs have been shown by per capita expenditure variables discussed earlier, where per capita expenditure variables have a positive and significant effect on property crime rates. Therefore, this research model yields a conclusion that the impact of poverty on property crime rates is insignificant.

The results analyze that unemployment rate has a significant positive effect on variable violent crime rates. This result is in line with Ceccato & Dolmen (2011), Hooghe et al (2010), Meloni (2014), and Engelen et al (2015). The unemployed tend to be more frustrated, wherein the individual has a higher tendency to do violence than individuals who have a job. Therefore, the higher the level of unemployment in a region will be able to increase the perpetrators of violence.

Furthermore, population density has a positive and significant effect only on the total and property crime rates. This supports the results of Meloni (2014), Hooghe et al (2010), Snowden & Freiburger (2015), Balleret al (2001), Porter & Purser (2010), Brush (2007), Kelly (2000). However, population density has no significant effect on violent crime rates. Moreover, the results show a negative sign. Liska & Chamlin (1984) describe the negative relationship between population and crime level with urbanism theory, where the region with high population has high social control which is shown by the ability of the community to regulate its members through formal and informal norms.

Table 4
Estimation Result of Spatial Econometrics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ln_TOT_CR	ln_PRO_CR	ln_VIO_CR	ln_TOT_CR	ln_PRO_CR	ln_VIO_CR	ln_TOT_CR	ln_PRO_CR	ln_VIO_CR
main									
ln_EXP	0.537** (0.014)	0.530** (0.015)	0.264 (0.609)	0.533** (0.014)	0.526** (0.016)	0.256 (0.620)	0.455** (0.047)	0.453** (0.047)	0.123 (0.813)
POVERTY	0.00240 (0.876)	0.00309 (0.838)	0.0316* (0.081)	0.00217 (0.887)	0.00290 (0.848)	0.0315* (0.084)	0.00170 (0.912)	0.00242 (0.873)	0.0304* (0.099)
TPT	0.0160 (0.318)	0.00541 (0.770)	0.0660* (0.098)	0.0171 (0.291)	0.00631 (0.735)	0.0667* (0.095)	0.0168 (0.299)	0.00609 (0.743)	0.0669* (0.095)
ln_DENSITY	0.0773** (0.027)	0.0843** (0.018)	-0.0901 (0.219)	0.0765** (0.026)	0.0835** (0.018)	-0.0875 (0.238)	0.0767** (0.024)	0.0830** (0.016)	-0.0861 (0.242)
GINI	3.061** (0.030)	2.696* (0.055)	5.676** (0.026)						
PALMA				0.378** (0.015)	0.334** (0.031)	0.660* (0.051)			
DECILE							0.0596*** (0.006)	0.0544** (0.012)	0.102** (0.044)
_cons	-1.894 (0.519)	-1.825 (0.535)	-5.487 (0.437)	-1.332 (0.652)	-1.326 (0.655)	-4.401 (0.531)	-0.226 (0.941)	-0.306 (0.921)	-2.504 (0.723)
lambda									
_cons	0.728*** (0.001)	0.707*** (0.002)		0.735*** (0.001)	0.712*** (0.002)		0.737*** (0.001)	0.711*** (0.002)	
rho									
_cons			0.774*** (0.000)			0.778*** (0.000)			0.771*** (0.000)
aic	1447.7	1502.3	2428.5	1448.5	1502.8	2429.4	1448.0	1502.0	2429.3
Squared corr.	0.087	0.067	0.078	0.085	0.066	0.077	0.086	0.067	0.077
Robust Standard Error									
p-values in parentheses									
* p<0.10, ** p<0.05, *** p<0.01									

Source: Authors' calculation using Stata 13

A statistical summary of the results with the GWR approach is shown in the table 5 and the results of the GWR are shown on the map on the next page. These results indicate that there is spatial heterogeneity in the relationship between the variables of expenditure, poverty, unemployment and population density to total crime rates. This shows that the influence of these variables varies between regions.

The result of concern lies in the existence of spatial heterogeneity in the relationship between expenditure inequality and the total crime rate. Spatial heterogeneity in this relationship occurs in the difference in the level of significance. In some regions, there is a significant relationship between inequality and total crime rate, but in other regions the relationship is insignificant. Nonetheless, all regions have a positive coefficient.

Table 5
Estimation Result of GWR

Variabel	Variabel Depend: ln_TOT_CR			
	Min	Max	Median	Mean
Intercept	-38.549248	4.082776	-1488928	-2.91009
ln_EXP	0.088929	2.906776	0.500189	0.591777
POVERTY	-0.032276	0.132547	0.020223	0.019421
ln_DENSITY	-0.109175	0.195378	0.061578	0.056618
GINI	0.79116	15.102685	3.709932	4.141265
TPT	-0.144557	0.061552	-0.000284	0.003562

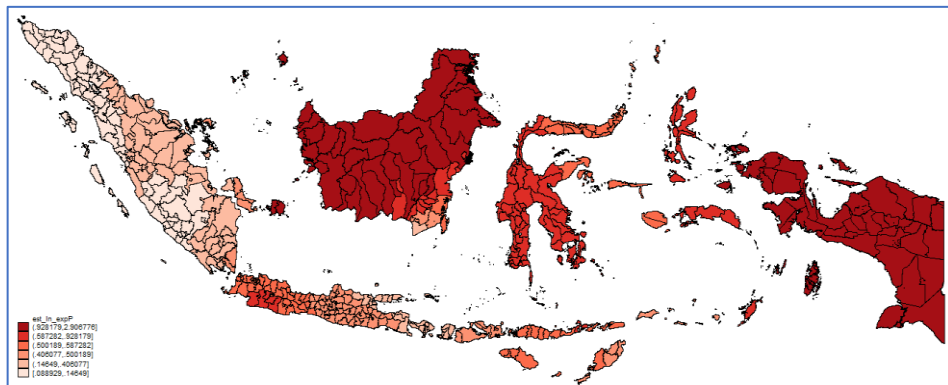
Source: Authors' calculation using GWR 4 software

To answer research questions, we conclude that inequality is a major factor in crime. This is shown by the two methods carried out in this study. In econometric spatial methods, all variables as an indicator of expenditure inequality have a positive effect on all types of crime. In the GWR model, a positive relationship between inequality and total crime rate occurs in all regions. This is different from other variables used in this study. These variables are not consistent in influencing crime rates both when the model is analyzed with the first method and the second method. For example, the unemployment variable, in the first method only has a significant positive effect on variable violent crime, but it does not significantly affect the total and property crime. Furthermore, in the second method, there is spatial heterogeneity in the relationship between unemployment and crime rates. In some areas unemployment has a positive effect on total crime rate, while in some areas unemployment has a negative effect.

5. CONCLUSION

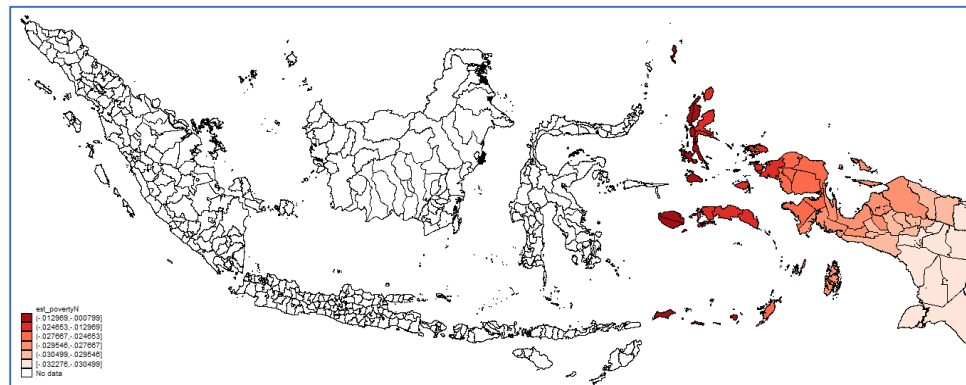
This study purpose to found the impact of expenditure inequality and socioeconomic conditions on crime rates in Indonesia. The results of global regression with spatial econometric approach and GWR show that inequality has a positively significant effect on crime rate, while the effects of socioeconomic variables are inconsistent. This results show that inequality is the most influential factor in crime rates in Indonesia. The occurrence of an increase in economic growth and other social factors that are not accompanied by equity, the crime will continue to increase. Education and health are two important factors in the problem of inequality. Investment in human resources which in turn can affect income (Yusuf, 2013). Policies initiated to provide social protection for the poorest people to fulfill their basic rights such as health and education in turn will have an impact on reduced inequality. When these policy programs run effectively in reducing disparities in spending, one of the multiplier effects that occur is a reduction in crime rates.

Figure 4. The positive impact of expenditure on total crime rates.



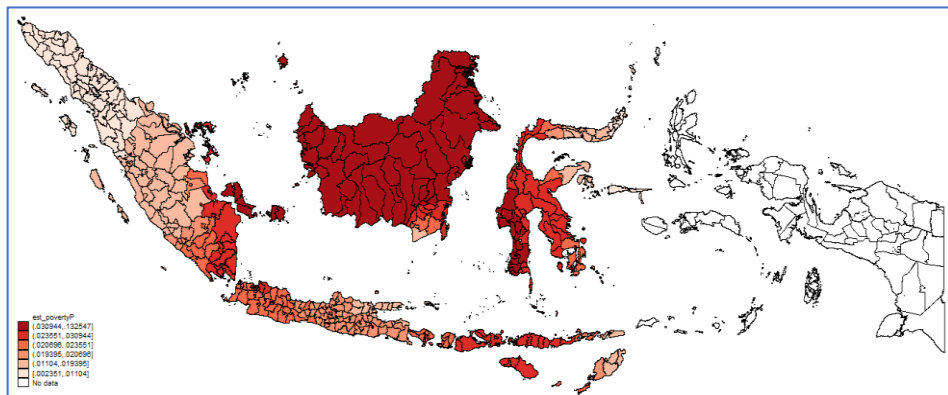
Source: Authors' calculation using GWR 4 and Stata 13

Figure 5.b The negative impact of poverty on total crime rates



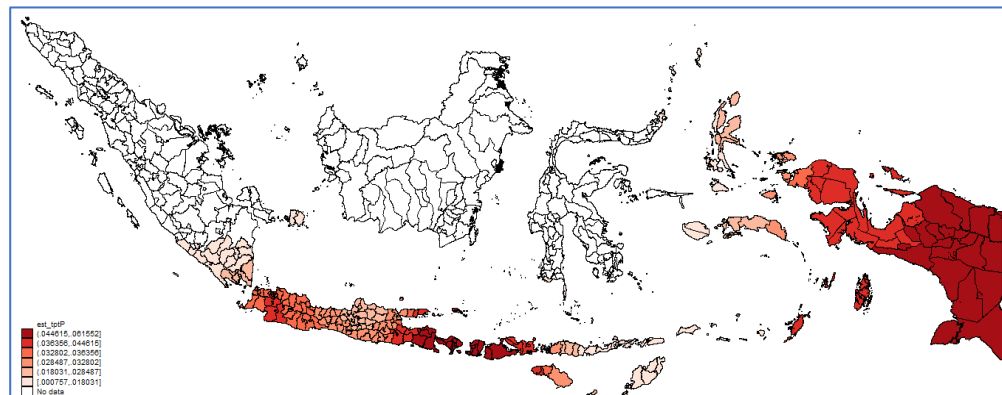
Source: Authors' calculation using GWR 4 and Stata 13

Figure 5.a The positive impact of poverty on total crime rates



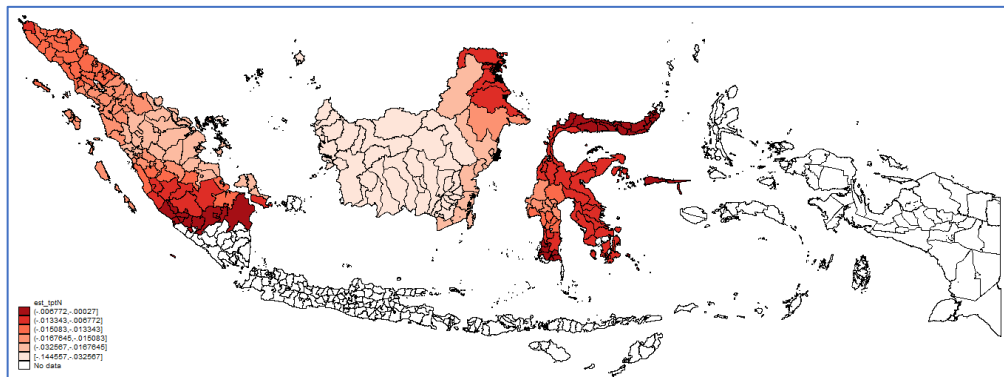
Source: Authors' calculation using GWR 4 and Stata 13

Figure 6.a The positive impact of unemployment rates on total crime rates



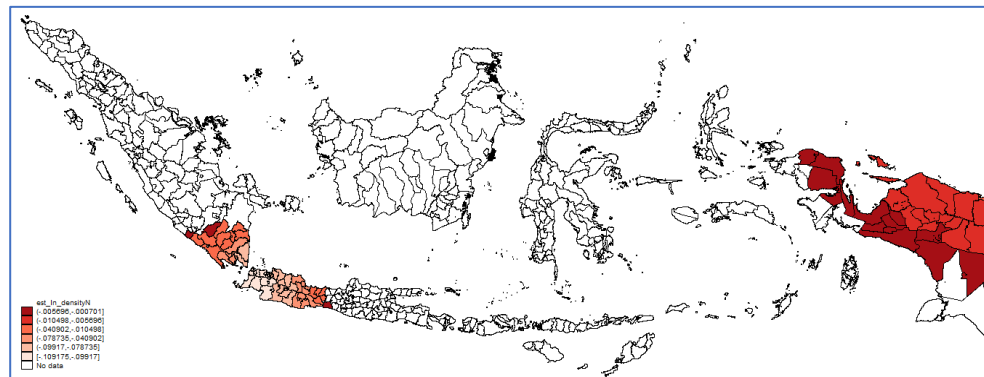
Source: Authors' calculation using GWR 4 and Stata 13

Figure 6.b The negative impact of unemployment rates on total crime rates



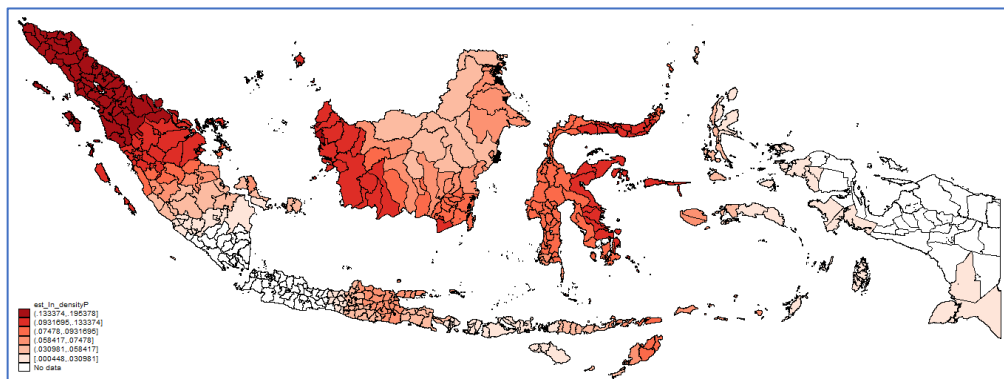
Source: Authors' calculation using GWR 4 and Stata 13

Figure 7.b The negative impact of Density on total crime rates



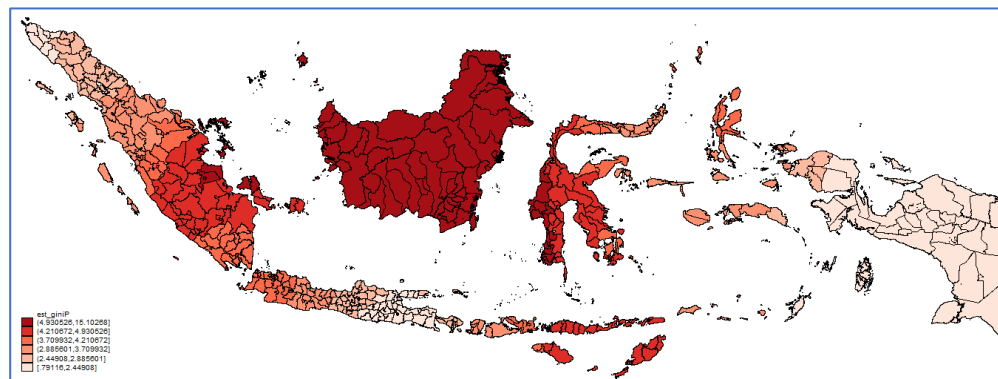
Source: Authors' calculation using GWR 4 and Stata 13

Figure 7.a The positive impact of Density on total crime rates



Source: Authors' calculation using GWR 4 and Stata 13

Figure 8 The positive impact of Gini Ratio on total crime rates



Source: Authors' calculation using GWR 4 and Stata 13

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