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SOCIO-ECONOMIC DETERMINANTS OF CRIME IN CENTRAL JAVA: SPATIAL ECONOMETRICS ANALYSIS

ABSTRACT

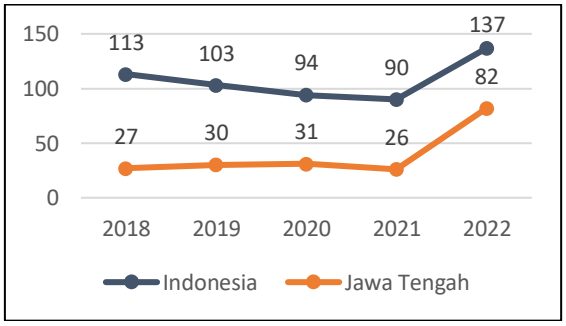
Several previous studies have proven that low socio-economic factors are the causes of crime. Central Java is a province with a fairly low level of socio-economic welfare. However, this province is also one of the provinces with the lowest crime rate in Indonesia. This research aims to prove the socio-economic factors including poverty, education, unemployment, income per capita, and area effect on the total crime in all districts of Central Java. This research is a quantitative research using the panel data from 35 districts of Central Java in the period of 2018-2022. The data was analyzed using spatial econometric methods with a panel data approach. Based on the results of Spatial Auto Regressive (SAR) with Fixed Effect Model (FEM) shows that education and income per capita have significant negative impact on crime.

Keywords: Econometrics, Crime, Space
JEL Classification: C49, K42, R12

INTRODUCTION

Crime is an important social problem to overcome. Criminality etymologically comes from the word "crimen" which means crime. A crime is an act that violates a judge's decision or written criminal law that is committed intentionally *(intentional act)* or negligence *(oomission)*, and is not done for defense or justification, and then threatened with sanctions by the state as a crime or violation (Carroll et al., 1977) . Based on data from , the number of crimes in Indonesia showed a decrease in 3 years from 2019 – 2021. The decrease was recorded from 294,281 cases in 2018 to 239,481 cases in 2021, or 18.62%. However, in 2022 there has been an increase in the number of high crimes in Indonesia, an increase of 55.78%. This figure is the highest number since the last 5 years. (Central Agency Statistics , 2023)

Meanwhile, when observed based on the crime rate between provinces, Central Java Province was recorded to have 82 cases of crimes per 100,000 population in 2022. This province ranks 4th lowest after the provinces of Banten, West Kalimantan, and West Java. However, when observed in a trend in the last 5 years, the crime rate in Central Java has increased significantly.



Source : Central Bodies Statistics , 2023

Figure 1. Population Risk of Being Exposed to Crime (per 100,000 Population) in 2018-2022

In the 2018-2022 period, the crime rate in Central Java Province was always far below the national average. In fact, in 2018-2021 the crime rate in Central Java Province has decreased from 27 to 26 cases. However, the increase in high crime rates in 2022 needs to be a concern for the government and security forces to be able to find the root cause and efforts to overcome it. (Central Agency Statistics , 2023)

The causes of crime can be explained in a number of theories namely, according to the theory of social disorganization, crime is closely related to the unorganized urban environment of the lower class and is characterized by weak social control institutions such as commercial enterprises, schools, and families, Residents in this region

experience conflict and despair which results in an increase in antisocial behavior. Meanwhile, according to social process theory, criminal behavior is a behavior that is learned from social relations in society. According to the perspective of crime economics, an individual will commit crime rationally by considering between costs (Shaw, 1942) (Larry, 2012) *and* benefits *which* in this case means losses and benefits that may be obtained if they commit crime. (Winter, 2008)

This is in line with a number of studies that have been conducted previously. Research shows that there is a relationship between socio-economic variables and crime. Poverty has a positive influence on crime, , , and . Meanwhile, education has a negative influence on crime (Mardinsyah et al., 2020) (Adri, Karimi and Indrawari , 2019) (Imran, Hosen and Chowdhury, 2018) (Hooghe *et al.* , 2011) (Handra et al., 2020) , (Adri, Karimi and Indrawari , 2019) , and . (Khan *et al.* , 2015)

Then in terms of economic factors, unemployment has a positive influence on crime, , . Also, the per capita income factor has a negative influence on crime, . However, the conditions in Central Java Province seem different from these studies. (Khan *et al.* , 2015) (Nadilla et al., 2018) (Hazra et al., 2018) (Andresen, 2012) (Handra et al., 2020) (de Blasio, Maggio and Menon, 2016) (Hooghe *et al.* , 2011) (Nugroho et al., 2015) (Nadilla et al., 2018) (Hazra et al., 2018)

This is because based on socio-economic factors, the welfare condition of the people of Central Java can be said to be quite low compared to the national average, but this province also has a low crime. This can be evidenced by the high percentage of poverty of 10.93%, as well as the low School Length Expectancy (HLS) of 12.81 years, and the low per capita income of IDR 28.36 million in 2022. Meanwhile, there has been an upward trend in the Open Unemployment Rate (TPT) of 24.61% in the last 5 years. (BPS Central Java, 2023)

Therefore, based on the considerations and empirical evidence that has been described. The purpose of this study is to analyze the influence of socio-economic factors that include poverty, education, unemployment, and per capita income on crime by considering spatial aspects to see the inter-regional relationships of 35 districts/cities in Central Java Province. This research is also expected to be used by the government and the police as a reference and consideration in formulating policies related to crime, as well as useful as educational information for the wider community

RESEARCH METHODS

A. Research Design

The type of research used in this study uses a quantitative approach. This study uses secondary data. This study uses documentation techniques in the data collection method. The documentation technique is carried out by recording based on pre-existing data sources. This study uses data on poverty percentage, length of school tenure, open unemployment rate, per capita income, and the number of crimes in Central Java Province in the period 2018 – 2022 sourced from the Central Statistics Agency. (Hardani *et al.* , 2020)

B. Data Analysis Techniques

This study uses a spatial econometric model with a panel data approach. This model is a linear regression on panel data that has interactions between spatial units or regions. This model will have a spatial lag variable on the dependent variable, meaning that there is a spatial relationship to the dependent variable. The existence of such spatial interconnectedness can be seen between the observed objects in any time period, but it can vary in different regions. The following are the stages of data analysis: (Elhorst , 2010)

1) Data Exploration

The first stage is data exploration. This stage aims to make the data to be analyzed further can be well understood. The data

exploration in this study was carried out using mapping to see the distribution pattern of the number of crimes in 35 districts/cities in Central Java for each year in the 2018-2022 period.

2) Panel Data Estimation

Panel data is obtained from *cross section* data, each of which is observed over a certain period of time. The use of panel data has the advantage that the data provided is more varied/informative because this type of data is a combination of *time series* and *cross section* (Gujarati, 2004) data. The panel data model has the following general equation form:

$$yit = \alpha + \beta 1x1it + \beta 2x2it + \beta 3x3it + \beta 4x4it + Eit \quad (1)$$

Information:

- y = Total Crime (Dependent Variable)
- β = Coefficients of independent variables
- x1 = Poverty Percentage
- x2 = Old School Expectations
- x3 = Open Unemployment Rate
- x4 = GDP per capita
- i = Unit to-i
- t = Time to-t
- ε = Interference variable (*Error term)*

This study has two types of panel data regression models that will be selected, one of which is to get the best model, as follows:

a. *Fixed Effect Model (FEM)*

This regression model states that the influence of unobserved units on vit is assumed to be constant. The equation of FEM (Baltagi, 2011) is expressed as follows:

$$yit = \alpha_i^* + \beta 1\ x1IT + \beta_2\ x2it + \beta 3\ x3it + \beta 4x4it + vit \quad (2)$$

The equation states α^* as the value of the constant of the ith unit, and β as the coefficient of the variable X (dependent variable), and vit as the remainder of the ith unit in the t-period.

b. *Random Effect Model (REM)*

This regression model states that the influence of unobserved units on vit is assumed to be random and the units are randomly selected based on a large number of (Baltagi, 2011) populations. The REM equation is expressed as follows:

$$yit = \alpha + \beta 1\ x1IT + \beta_2\ x2it + \beta 3\ x3it + \beta 4\ x4it + wit \quad (3)$$

$$Stuttgart = Eit + vit \quad (4)$$

The equation states α as a constant value, and β as the coefficient of the variable X (dependent variable). Meanwhile, wit as a residual component of εi which is the residue of the specific influence of the ith unit, and vit which is the residue of the ith unit in the tth period.

3) Hausman Test

The test aimed to select one of the two FEM and REM regression models based on the most appropriate model with panel data from the study. The Hausman test has the following hypothesis:

H0: Correlation (Xit, μit) = 0 (*Random Effect* Featured hotels)

H1: Correlation (Xit, μit) $\neq$ 0 (*Fixed effect* Featured hotels)

4) Matrix Weighting (W)

The weighting matrix W shows the *neighboring* relationship between the regions of the model used. This study uses a weighting matrix with (P , 2019) *a queen contiguity approach.* This is because the research area, namely Central Java Province, has the character of being adjacent to each other between districts/cities so that approaches that directly intersect both sides and

angles are more suitable for use.

5) Spatial Autocorrelation Test

This test aims to ensure the existence of spatial dependencies or autocorrelations between the observed regions before performing spatial regression. One of the motodes that can be used is *Pesaran's test of cross section dependence.* (De Hoyos et al., 2006)

Spatial dependency testing using *Pesaran's CD* or *Breusch–Pagan's LM* was performed with the following hypothesis:

H0: p − Value > 0.05 (no dependencies between regions)

H1: p − Value < 0.05 (there are dependencies between regions)

6) Lagrange Multiplier *(LM)* Test

This test aims to select the initial regression through the detection of spatial dependencies or the effects of spatial interactions on specific data. The LM test is divided into two, namely LMerror and LMlag (Baltagi *et al.* , 2007). In this study, *the LM test for spatial panel* was used with the following hypothesis:

a. Hypothesis on LMerror
   H0: $\rho = 0$ (no spatial error)
   H1: $\rho \neq 0$ (there is a spatial error)
b. Hypothesis on LMlag
   H0: $\lambda = 0$ (no spatial lag)
   H1: $\lambda \neq 0$ (there is spatial lag)

7) Estimation of the Spatial Model of the Data Panel

This study uses spatial model estimation of panel data to determine the spatial influence between the variables studied, as well as the influence of independent variables. The spatial regression model differs from the standard linear regression model. The difference lies in the existence of additional regressors to determine spatial dependencies in the form of *spatial lag error variables* (Wu), *spatial lag independent variables* (WX), and *spatial lag dependent variables* (WY). Based on the three forms of interaction in these spatial elements, the spatial econometric model of the panel data approach that can be used according to is as follows: (Elhorst , 2010) (Anselin , 2008)

a. *Spatial Durbin Model* (SDM)

This spatial regression model shows that dependent variables in a region are influenced by independent variables in that region and are also influenced by changes in the value of dependent variables and independent variables in neighboring regions. (Fitriani et al., 2019)

b. *Spatial Autoregressive Model (SAR)*

This model is also called *spatial lag,* which is a spatial regression model that shows that dependent variables in a region are influenced by dependent variables in that region and in neighboring regions.

c. *Spatial Error Model (SEM)*

This spatial regression model shows the spatial influence that occurs on *random errors* or leftovers.

8) Classic assumption testing

This test aims to determine the feasibility of the model selected in this study. The feasibility of the regression model was assessed from the normally distributed data and there were no symptoms of heteroscedasticity or multicollinearity. (Ghozali, 2016)

a. Normality Test

Normality testing aims to find out whether the residual or variable in a distributed model is normal or not. This study uses the Shapiro-wilk Normality Test with the following hypothesis:

H0: p − Value > 0.05 (normal

distributed residual data)

H1: p − Value < 0.05 (residual data is not distributed normally)

b. Heteroscedasticity Test

Heteros-kedasticity testing aims to show the *variance* and residual inequality from one observation data to another. Symptoms of heteroscedasticity are expressed if *the variance* and residual of an observation to another observation are different. On the other hand, if one observation to another observation remains, then homoscedasticity is declared. This study uses the Breusch-Pagan Test with the following hypothesis: (Baltagi, 2011)

H0: p − Value > 0.05 (no symptoms of heteroscedasticity)

H1: p − Value < 0.05 (there are symptoms of heteroscedasticity)

c. Multicollinearity Test

Multi-collinearity testing aims to show the relationships between independent variables in the model used through *the Variance Inflation Factor* (VIF) value. A data is declared to have symptoms of multicollinearity if the VIF value is > 10. On the other hand, if the VIF value is < 10, then the data is declared free from symptoms of multicollinearity. (Gujarati, 1995)

9) Model Goodness of *Fit* Test

The test aims to test the feasibility of the model used in the study. In this model, the test of the model goodness criteria is determined from the *values of the Akaike Information Criterion* (AIC) and *Bayesian Information Criterion (*BIC). (Lottmann, 2012)

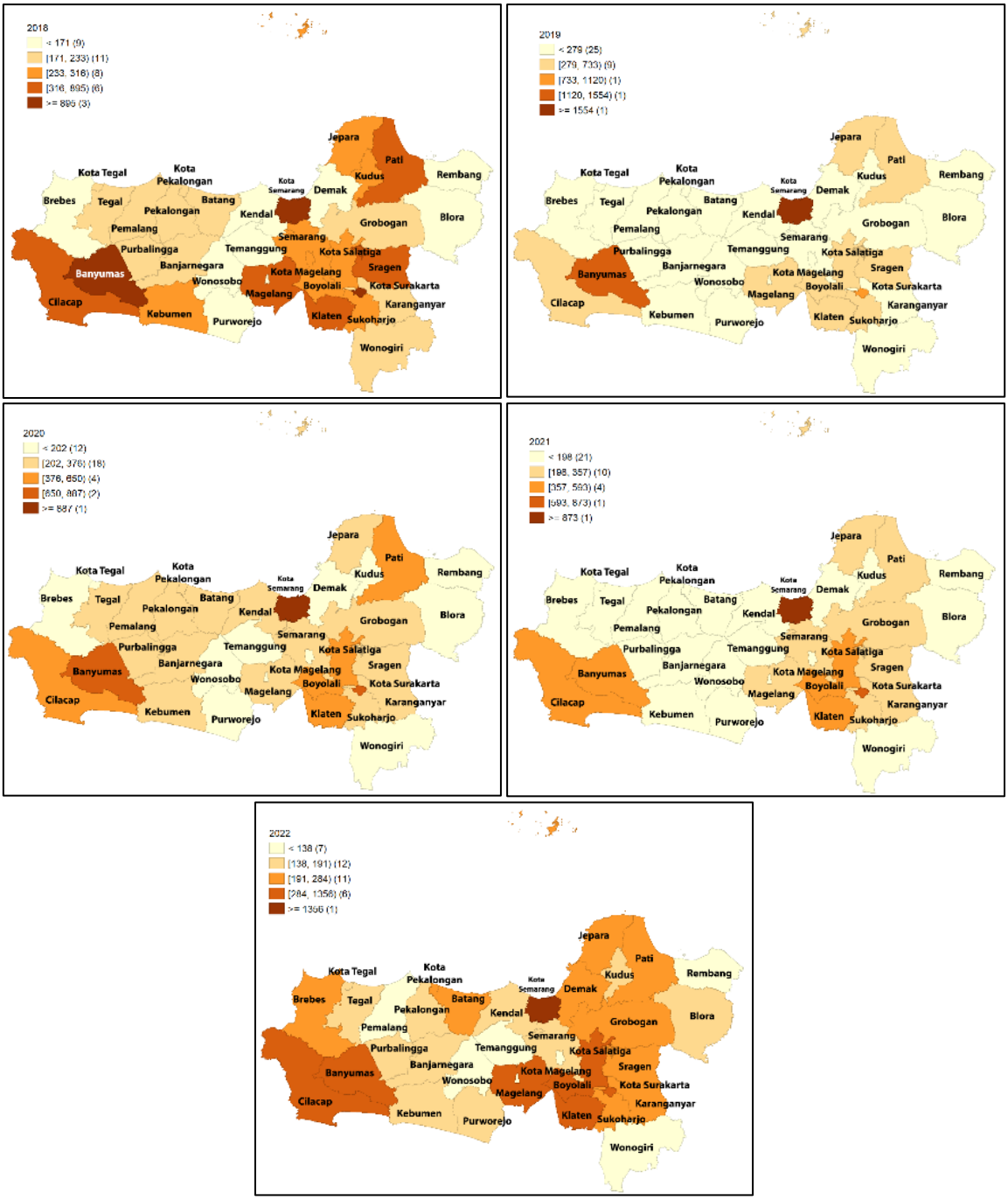
10) Determining the Best Model

The determination of the best model is determined through the selection of AIC and BIC values from all regression models viewed based on the smallest value. After that, the interpretation of the selected model is carried out. (Gujarati, 2004)

RESULTS AND DISCUSSION

1. Data Exploration

The data exploration stage aims to describe the distribution of the number of crimes in districts/cities of Central Java Province in the 2018-2022 period. The results of the data exploration showed five color gradations that explain the number of crime at the district/city level, the darker color indicates that the area has a higher crime rate, while the lighter colored area indicates that the area has a lower crime rate. As shown in the following pictures.



Source : GeoDa, data processed 2024

Figure 2. Map of the Distribution of Crime in Regencies/Cities in Central Java in 2018 – 2022

Based on the distribution of crime in Figure 4, it can be observed that there is not enough similarity in cluster colors from the number of crimes in neighboring areas between the study periods. Regencies/cities with a high crime rate such as Semarang City, Surakarta City, and Banyumas Regency are actually neighbors with many districts/cities that have a low crime rate so that it shows that the neighborhood relationship is not enough can affect the number of crime in the surrounding area. Furthermore, statistical testing was carried out through a spatial regression model.

2. Estimation of the Data Panel Model

This study uses panel data regression to select one of the best models of two panel data models, namely *the fixed effect model* and *the random effect model*. After that, the stage continues with the Spatial Autocorrelation Test on the selected model. The estimated results of the two models are shown in Table 1 and Table 2.

Table 1. Fixed Effect Model Panel Data Modeling

Variable	Coefficient	Std. Error	t-value	p-value
Poverty Percentage	-0,0487471	0,0489741	-0,9954	0,3213268
Old School Expectations	-0,5483851	0,1482311	-3,6995	0,0003126***
Open Unemployment Rate	0,0064865	0,0172320	0,3764	0,7071910
Per Capita Income	-1,0935704	0,4416806	-2,4759	0,0145170*
Meaning. Codes:		**0 '***' **	**0,001 '**' **	**0,01 '*' **

Source: Rstudio, data processed 2024

Based on Table 1, the variable poverty percentage and open unemployment rate did not have a significant effect on the number of district/city crime in Central Java Province because the p-value > 0.05. Meanwhile, the variables of length of schooling and per capita income have a significant effect on the number of crimes because they have a p-value of < 0.05. Based on equation 2, the results of modeling panel *fixed effect model* data are obtained as follows:

$$Yit = - 0.0487471\ X1it – 0.5483851\ X2it + 0.0064865\ X3it - 1.0935704\ X4it \quad (5)$$

The equation states the statistical form of the variable Y_{it} as the number of crime in the first region in the year t and the variables that affect it.

Table 2. Random Effect Model Panel Data Modeling

Variable	Coefficient	Std. Error	t-value	p-value
C	6,3494767	1,3837881	4,5885	0,0045
Poverty Percentage	-0,0274804	0,0287342	-0,9564	0,3389
Old School Expectations	-0,0885837	0,1051200	-0,8427	0,3994
Open Unemployment Rate	-0,0061224	0,0164025	-0,3733	0,7090
Per Capita Income	0,1589383	0,2237295	0,7104	0,4775
Meaning. Codes:		**0 '***' **	**0,001 '**' **	**0,01 '*' **

Source: Rstudio, data processed 2024

Based on Table 2, the variables of poverty percentage, length of school tenure, open unemployment rate, and per capita income did not have a significant effect on the crime rate of districts/cities in Central Java Province with a p-value of > 0.05. Based on equation 3, the *random effect*

regression equation of the model is obtained as follows:

Yit = 6.3494767 – 0.0274804 X1it – 0.0885837 X2it – 0.0061224 X3it + 0.1589383 X4it .....(6)

The equation states almost the same thing as the previous model but with different influences.

3. Hausman Test

After the panel data model is estimated, then the two models will be selected through the Hausman Test. Based on the results of the Hausman Test, it can be found that the p-value is 0.00 < 0.05 which means that *the fixed effect model* is the selected panel model.

4. Spatial Inverter Matrix

The results of the weighting carried out in 35 districts/cities in Central Java Province are as follows.

Table 3. Spatial Inverter Matrix

Matrix	Description
Dimension	35 x 35
Total	149
Min	1
Average	4.257143
Max	8
Observation with 1 Connection	Magelang City, Salatiga City
Observation with 8 Connections	Boyolali Regency, Semarang Regency

Source: Rstudio, data processed 2024

The spatial weight matrix formed has an order of 35 x 35 according to the number of districts/cities in Central Java. This province has as many as 149 regional connections with at least 1 regional connection, namely Magelang City and Salatiga City. Also, the maximum number of 8 regional connections, namely Boyolali Regency and Semarang Regency. This province also has an average of 4 regional connections at the district/city level.

5. Spatial Autocorrelation Test

This test aims to ensure the existence of spatial dependencies or spatial autocorrelations in districts/cities of Central Java Province. This study used *the Breusch-Pagan's LM* test on observational variables.

Based on the results of the Breusch-Pagan's LM test, a p-value of 0.00 < 0.05 was obtained, then H_0 was rejected. This shows that there is a relationship of regional dependence on *district/city cross section* data in Central Java Province.

6. Lagrange Multiplier (LM) Test

Based on the results of the *Lagrange Multiplier test*, the p-value of the LM error is 0.1999 > 0.05, which means that there is no spatial dependency of the error. Meanwhile, the p-value of LM lag is 0.00 < 0.05, which means that there is a spatial dependency of lag. Therefore, it can be concluded that *the Spatial Autoregressive Model* (SAR) is used for spatial estimation of sensor data. However, this study also estimates the spatial model of panel data with *the Spatial Durbin Model* (HR) and *Spatial Error Model* (SEM) to compare the best values at the end of the analysis stage.

7. Estimation of the Spatial Model of the Data Panel

The following are the results of the estimation using *the Spatial*

Autoregressive Model fixed effect.

Table 4. ***Spatial Autoregressive Model (SAR)***

Variable	Coefficient	Std. Error	t-value	p-value
Poverty Percentage	-0,0517657	0,0442811	-1,17	0,242
Old School Expectations	-0,5093581	0,2147416	-2,37	0,018*
Open Unemployment Rate	0,0051039	0,0170224	0,30	0,764
Per Capita Income	-1,08996	0,3161704	-3,45	0,001**
Lambda	0,0940994	0,1102918	0,85	0,394
Meaning. Codes:		**0 '***' **	**0,001 '**' **	**0,01 '*' **

Source: Stata, data processed, 2024

Based on Table 4, the Long School Expectations (HLS) and per capita income have a p-value of < 0.05 (alpha level of 5%), meaning that these variables have a significant effect. Meanwhile, the percentage of poverty, open unemployment rate, and spatial lag of the dependent variables (lamda) had a p-value of > 0.05 (alpha level of 5%) which means that the three variables did not have a significant effect. Based on the *Spatial Autoregressive Model fixed effect* (SAR FE) test, the following equations were produced:

$yit = \sum we\ yjt - 0.0517657\ x1_{it} - 0.5093581\ X2it + 0.0051039 - 1.08996\ X4it$ .....(7)

Based on the results of the SAR FE modeling test, a variable coefficient of poverty percentage was produced of -0.0517657 which means that if the percentage of the first district/city in the twentieth year increases by 1%, then the number of crime in the district/city-i will decrease by 0.0517657%. The Expectation of School Length (HLS) has a coefficient of -0.5093581 which means that if HLS increases by 1%, then the number of crimes will decrease by 0.5093581%. The Open Unemployment Rate (TPT) has a coefficient of 0.0051039, meaning that if the TPT increases by 1%, it will increase the number of crimes by 0.0051039%. Per capita income has a coefficient of -1.08996 which means that if the per capita income increases by 1%, it will reduce the number of district/city crime by 1.08996%. The value of the dependent lag variable spatial coefficient (lamda) is 0.0940994, which means that if the number of crimes in districts/cities-j increases by 1%, it will increase the number of crimes in districts/cities-i by 0.0940994 multiplied by the variable Y of each district/city-j (neighboring districts/cities).

8. Classic Assumption Testing

This test is used to determine the feasibility of the selected model, namely SAR *fixed effect*.

a. Normality Test

Based on the results of the Shapiro-wilk test, it is known that

the p-value is 0.00 < 0.05 (alpha level 5%). Then H_0 is rejected, meaning that the residual data is not distributed normally. If the residual data is not normally distributed in the classical assumption test, there is an asusmi *central limit theorem* which means that if the number of observations is more than 30, then the Normality Test can be ignored This is in accordance with this study which has as many as 175 observations so that the value of the Normality Test can be ignored. (Ajija et al., 2011).

b. Heterokedasticity Test

Based on the results of the Breusch-pagan Test showing a p-value of 0.00 < 0.05 (alpha level 5%), then H_0 is rejected so that it can be concluded that there are symptoms of heteroscedasticity in the SAR *fixed effect*. However, the heteroscedasticity test can be ignored because in the Classical Assumption Test because the Heterokedasticity Test is intended for *the Ordinary Least Square* (OLS) which is the simplest method of estimating regression coefficients. Spatial regression is the result of the development of the classical linear model so that the use of simple regression analysis will produce assumptions such as that one residual value is correlated with another and the variety is not constant. (Anselin , 2009)

c. Multicollinearity Test

Based on the results of the Multicollinearity Test, it can be concluded that each independent variable has a VIF value of < 10, which means that the data is free from the symptoms of multicollinearity.

9. Model Goodness Test

Based on the results of the estimation of the three possible model forms that can be used, namely HR, SAR, and SEM, the following values were obtained:

Table 5. The Value of Model Goodness

Result	TBSP	SAR	SEM
AIC	-85,19739	-88,88644	-88,54738
BIC	-53,54953	-69,89773	-69,55866

Source: Stata, data processed, 2024

In this study, there are three models that are compared, namely *the Spatial Durbin Model* (HR), *Spatial Autoregressive Model* (SAR), *and Spatial Error Model* (SEM). The three spatial models use the *Fixed Effect Model* (FEM) regression model. The test results showed that the largest AIC and BIC values were found in the HR model, while the smallest values were found in the SAR model. From the three models, one of the best models to be used will be selected as a result of this research.

10. Determining the Best Model

The selection of the best model is determined through the value of the smallest AIC and BIC. Based on the results of data analysis, it can be stated *that Spatial Autoregressive Model fixed effect* is the best model.

DISCUSSION

Based on the results of data analysis using SAR *fixed effect*, it can be determined the spatial influence and influence of each independent variable on the dependent variable. The following is a discussion of the results of the data analysis:

1. The Influence of Poverty on Crime

Based on the results of the spatial regression of the panel data, it can be

seen that the relationship between the percentage of poverty and the number of crimes does not have a significant effect. This shows that areas with high poverty are not always associated with high crime rates.

In contrast to the social disorganization theory, which states that the crime rate is only sensitive to social forces that are destructive and operate in low-class urban environments. This research also proves that areas with low poverty are related to a good level of community welfare so that it can encourage criminals to carry out their actions in the area to get greater profits. Therefore, crime can occur without being influenced by the poverty conditions that exist in an area. This research is relevant to research conducted by and which shows that there is no significant effect of poverty on crime. (Masfiatun , 2019) (Hardiawan , Joseph and São Paulo, São Paulo , 2019)

2. The Influence of Education on Crime

Based on the results of the spatial regression of the panel data, it can be seen that education has a significant negative effect on crime. This research is related to previous research conducted by , (Mardinsyah et al., 2020) (Steviani et al., 2020) , and which in its research stated that education has a negative and significant effect on crime because higher education directly increases individual income. Also, it can increase the opportunity cost and the cost of time spent in criminal acts. (Khan *et al.* , 2015)

Meanwhile, according to the theory of social processes, educational experience can be a social control in public relations, meaning that a person who has received higher education will be able to be a deterrent to criminal behavior that is believed to occur in society. Therefore, through the improvement of education measured from HLS can be a reference in increasing the opportunity to obtain education so that individuals are prevented from criminal behavior.

3. The Impact of Unemployment on Crime

Based on the results of the spatial regression of the panel data, it can be seen that the relationship between unemployment and crime does not have a significant influence. In contrast to the theory of crime economics which states that the limitation of obtaining income through legal sources or employment will encourage the occurrence of crime because there is a desire to meet the needs of life, although there is a risk of loss that may be borne when committing criminal acts.

Meanwhile, these findings also show that areas with high unemployment are not necessarily related to high crime rates. Areas with low unemployment are also related to the large number of jobs available so that they can encourage criminals to carry out their actions in the area. Therefore, crime can occur without being influenced by the unemployment conditions that exist in an area. This study is relevant to the research conducted by , , and which shows that there is no significant effect of unemployment on crime. (Mardinsyah et al., 2020) (Masfiatun , 2019) (Hardiawan , Joseph and São Paulo, São Paulo , 2019)

4. The Effect of Per Capita Income on Crime

Based on the results of the spatial regression of the panel data, it can be

seen that per capita income has a significant negative effect on crime. This research is in accordance with research conducted by those who stated that per capita income has a negative and significant effect on crime because good macroeconomic conditions improve people's welfare and reduce the potential for crime. (Hazra et al., 2018)

In addition, in the economics of crime, it is explained that a person considers profits and losses in committing criminal crimes. The losses in question can be in the form of the risk of being caught, sanctions, or fines that must be paid or other things. Meanwhile, profits can be in the form of the proceeds of crimes committed such as money, valuables, self-satisfaction, or the fulfillment of one's needs. Of course, if someone has a high income, it will eliminate the motivation to get money or valuables illegally with the risk of being caught, fined, or sanctioned.

5. Spatial Relationship of Crime in Regencies/Cities in Central Java Province

Based on the results of the spatial regression of the panel data, it can be seen that the relationship between the regions does not have a significant effect on crime between one region and the neighboring region. This research is different from previous research which argued that there is a spatial influence on crime because criminals in an area also carry out actions around their target areas, (Cracolici et al., 2009) (Hooghe *et al.* , 2011) , , and (Nugroho et al., 2015) (Hardiawan , Joseph and São Paulo, São Paulo , 2019) . Nonetheless, these findings can be explained in the theory of social processes, that crime can be learned from social interactions in society. However, if social control in society is stronger, it can hinder the spread of criminal behavior.

CONCLUSION

Based on the results of data analysis, it can be concluded that the percentage of poverty does not have a significant effect on the number of crime. Harapan Lama Sekolah (HLS) has a significant negative effect on the number of crimes. The Open Unemployment Rate (TPT) has no significant effect on the number of crimes. Per capita income has a significant negative effect on the number of crimes. In addition, spatial relationships do not have a significant effect on the number of crimes.

RECOMMENDATIONS

Based on these conclusions, this research is expected to be a recommendation for a number of governments as follows:

1. The Central Java Provincial Government needs to improve the development of education for the community. A number of programs that can be carried out are accelerating the realization of equitable and quality education through the construction of adequate school facilities both in quality and quantity according to the needs of students, as well as improving teacher competence through academic training and scholarships to continue education. In addition, the government also needs to ensure the welfare of teachers and education personnel by setting regulations to increase salaries so that they are not lower than the provincial minimum wage.
2. The Central Java Provincial Government also needs to increase the per capita income of the community. A number of programs that can be carried out include increasing government spending, especially those that focus on low-income communities and MSME actors, such as the provision of capital assistance, digitalization assistance, ease of business licenses, and the opening of bazaars as a

medium for promoting poduk. In addition, the government also needs to increase the minimum wage for districts/cities in order to increase the income of the lower class in areas with high crime.

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