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The Influence of GDP per Capita, Income Inequality, Population Density, and Unemployment on the Crime Index in 7 ASEAN Countries

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Abstract

This study aims to determine the effect of gross domestic product (GDP) per capita, income inequality, population density, and unemployment on the crime index in 7 ASEAN countries during the period 2013-2023, both in the long term and short term. Using panel data with a total of 77 observations. The results of the study indicate that the GDP per capita variable has a negative and significant effect on the crime index in the seven ASEAN countries in the long term, while in the short term it has a positive and insignificant effect on the crime index in the seven ASEAN countries. The income inequality variable has a positive and significant effect on the crime index in the seven ASEAN countries in the long term, while in the short term it has a positive and insignificant effect on the crime index in the seven ASEAN countries. The population density variable has a positive and significant effect on the crime index in the 7 ASEAN countries in the long term, while in the short term it has a positive but insignificant effect on the crime index in the 7 ASEAN countries. The unemployment variable has a negative and significant effect on the crime index in the 7 ASEAN countries in the long term, while in the short term it has a positive but insignificant effect on the crime index in the 7 ASEAN countries.

Keywords: crime index; GDP per capita; income inequality; population density; unemployment.

1. Introduction

Crime has become an inevitable global issue, harming individuals and groups and negatively impacting the social and economic stability of a country, both in developed and developing countries. This phenomenon is often associated with the economic conditions of a region[1]. Crime indices are used as important indicators to measure crime rates in a region, enabling in-depth analysis of the factors that cause them.

In the ASEAN region, with its diverse economic and demographic dynamics, large population, and developing countries facing economic and social challenges, as well as increasingly strong social integration and high socio-cultural diversity, these factors can create opportunities for crime. According to the Global Organized Crime Index, the average crime index value in the ASEAN region is in the range of 40-60% [2].

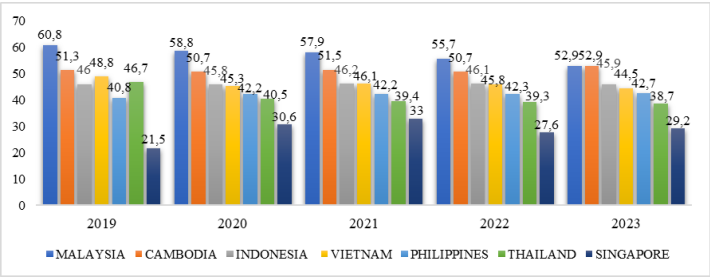

Figure 1.1 Crime Index 2019-2023

Source: Numbeo (2024)

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During this period, Malaysia was recorded as the country with the highest crime rate, while Singapore ranked as the country with the lowest crime rate. In 2022, Malaysia recorded the highest crime index with a score of 55.7%, while Singapore had the lowest crime index of 27.6%. Malaysia and Cambodia had the highest crime index rates with the same percentage of 52.9% in 2023, while Singapore remained in the lowest position with a crime index rate of 29.2%. The high crime rates indicate an increasingly unsafe societal condition.

The fluctuating security conditions in ASEAN countries are inherently linked to various socio-economic factors. GDP per capita, as a proxy for the average standard of living of the population, often serves as an important indicator, suggesting that higher GDP levels may indicate better economic opportunities and reduce motivation for crime [3]. However, on the other hand, inequality in wealth distribution can create sharp social disparities. This income inequality can trigger frustration, social jealousy, and increase individual motivation to engage in illegal activities as a shortcut to achieving a better standard of living, thereby potentially increasing the crime index [4].

In addition, population density also plays a crucial role. Densely populated urban areas tend to have higher levels of social interaction but can also be accompanied by anonymity, pressure on resources, and greater potential for conflict, creating an environment that is more vulnerable to crime [5]. High population density in some major cities in ASEAN, coupled with limited infrastructure and public services, can exacerbate this situation. Unemployment, as one of the fundamental economic issues, can directly influence criminal behavior. The absence of stable income and bleak job prospects can drive desperate individuals to turn to criminal activities to meet their basic needs [6].

Therefore, this study will examine how GDP per capita, income inequality, population density, and unemployment affect the crime index in seven ASEAN countries in the long and short term.

2. Literature Review

2.1 *Crime Index*

Crime index is a measure used to assess the level of crime in a region or country. The crime index typically reflects the percentage increase or decrease in crime rates over a one-year period compared to a specific base year (the previous year). As such, the crime index serves as an important tool for understanding crime dynamics and formulating more effective prevention policies. This crime index is believed to effectively reflect the safety level of a region or country. The higher the crime index, the lower the safety level of the region or country in question.

2.2 *GPC per Capita*

Gross Domestic Product (GDP) per capita is a measure of the average income or economic output per individual in a country over a given period. GDP per capita is often used as an indicator of the level of welfare and economic progress of a region. Gary Becker, in his theory of criminal economics, states that individuals make rational decisions [7]. A person will commit a crime if the benefits gained from the crime exceed the costs or risks of punishment. An increase in GDP per capita can be interpreted as an increase in legal income opportunities, which in turn will increase the opportunity cost of committing crime (due to the loss of higher legal income if caught). Therefore, an increase in GDP per capita is expected to reduce crime.

2.3 Income Inequality

Income inequality refers to the uneven distribution of income among the population of a region or country. The Gini index is a common measure of income inequality, with higher values indicating greater inequality [8]. From the perspective of radical criminology or critical criminology theory, Marx argued that in a capitalist system, class conflict between the bourgeoisie (capital owners) and the proletariat (working class) is fundamental [9]. Extreme income inequality is a direct consequence of the bourgeoisie's exploitation of the proletariat, creating conditions of poverty and marginalization for the majority of the population. In this view, crime is not merely deviant individual behavior, but a response to unfair economic conditions.

2.4 *Population Density*

According to Bronfenbrenner in his ecological theory, a person's behavior, including the potential for crime, is greatly influenced by various interconnected environmental factors, such as population density, population mobility, the relationship between villages and cities, especially the process of urbanization, as well as conditions in areas with high crime rates and slum housing. The higher the population density in an area, the more diverse the social conflicts that will arise [5]. Additionally, Shaw & Mckay in their theory of social disorganization explain that high population density, especially in urban areas, can lead to social disorganization [10]. Dense environments are often characterized by high population mobility and cultural heterogeneity, which can weaken social bonds and informal control mechanisms within communities. As a result, such environments become more vulnerable to crime due to a lack of surveillance and community solidarity.

2.5 *Unemployment*

Unemployment refers to a situation in which individuals who are actively seeking work are unable to find employment. High unemployment rates are often identified as one of the triggers of social problems, including crime [6]. In line with Robert K. Merton's strain theory, which explains that crime arises when there is a gap between desired cultural goals (e.g., wealth) and the legitimate institutional means of achieving them.

3. Research Method

The method used in this study is quantitative. The data collected is annual data, and the type of data used in this study is secondary data in the form of panel data, which is a combination of time series and cross-sectional data consisting of 7 ASEAN countries with a total of 77 observations. The data analysis technique used in this study is Autoregressive Distributed Lag (ARDL) Panel. Data analysis can be formulated with the equation:

$$CRIME_{i,t} = \alpha_0 + \alpha_1 GDPPC_{it} + \alpha_2 INEQ_{it} + \alpha_3 PDEN_{it} + \alpha_4 UNEMP_{it} + \beta_1 GDPPC_{it} + \beta_2 INEQ_{it} + \beta_3 PDEN_{it} + \beta_4 UNEMP_{it} + \varepsilon_{it}$$

Description:
CRIME = Crime Index (%)
GDPPC = Gross Domestic Product per Capita (USD)
INEQ = Income Inequality (%)
PDEN = Population Density (people/km^2)
UNEMP = Unemployment (%)
α = Constanta
i = Cross section
t = Time series
α1 – α4 = Long term coefficient
$\beta 1 - \beta 4$ = Short term coefficient
εit = Error

4. Results and Discussion

4.1 *Panel Unit Root Test (Stationarity Test)*

This test determines whether the data to be used or analyzed has stationarity or not and to find out whether the data is stationary at level I(0) or first difference I(1).

Table 4.1. Panel Unit Root Test

Variable	Level/First Different	Intercept/Intercept & Trend	Probability PP-Fisher	Decision
Crime Index	Level	Intercept	0.0000	I(1)
		Intercept & Trend	0.0000	
	First Different	Intercept	0.0000	
		Intercept & Trend	0.0034	
GDP per Capita	Level	Intercept	0.1895	I(0)
		Intercept & Trend	0.4482	
	First Different	Intercept	0.0001	
		Intercept & Trend	0.0037	
Income Inequality	Level	Intercept	0.0001	I(0)
		Intercept & Trend	0.0201	
	First Different	Intercept	0.0001	
		Intercept & Trend	0.0133	
Population Density	Level	Intercept	0.0000	I(0)
		Intercept & Trend	0.8966	
	First Different	Intercept	0.0208	
		Intercept & Trend	0.0079	
Unemployment	Level	Intercept	0.0044	I(0)
		Intercept & Trend	0.0037	
	First Different	Intercept	0.0000	
		Intercept & Trend	0.0000	

Source: Data Processing Results, 2025

The Crime Index variable is at level (I(0)) with a probability value less than the significance value of 5%. Meanwhile, the variables of GDP per capita, income inequality, population density, and unemployment are at the first difference level (I(1)) with probability values less than the significance value of 5%.

4.2 *Optimum Lag Test*

Determining the optimal lag in the ARDL model is carried out to identify the most appropriate lag combination to use. In this research, to determine the optimal lag length, the Akaike Information Criterion (AIC) criteria will be used.

Table 4.2. Optimum Lag Test

Model	LogL	AIK	Spesifikasi
1	220.521172	-4.986319	ARDL(1,1,1,1,1)

Source: Data Processing Results, 2025

The best model selected in this study is Model 1: ARDL (1,1,1,1,1). That is, for the value of the Crime Index variable (Y) = 1 lag, the value of the GDP per Capita variable (X1) = 1 lag, the value of the Income Inequality variable (X2) = 1 lag, the value of the Population Density variable (X3) = 1 lag, and the value of the Unemployment variable (X4) = 1 lag with the smallest AIC value of -4. 986319.

4.3 *Panel Cointegration Test*

This test aims to determine whether there is a short-term to long-term relationship between the dependent and independent variables.

Table 4.3. Panel Cointegration Test-Pedroni

	t-Statistic	Probability
Panel PP Statistic	-2.309125	0.0105

Source: Data Processing Results, 2025

The results of the cointegration test using the Pedroni test show a Prob. value of 0.0105, which is smaller than the significance value of 5% (0.05), so the data is considered cointegrated or there is a long-term relationship, thus it can be stated that all variables used are cointegrated.

4.4 *ARDL Panel Model Estimation Result*

Table 4.4. ARDL Panel Model Estimation Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		Long Run Equation		
GDPC	-1.108381	0.076028	-14.57859	0.0000
INEQ	4.534412	0.251451	18.03299	0.0000
PDEN	4.940074	0.202409	24.20644	0.0000
UNEMP	-0.359763	0.049533	-8.875718	0.0000
		Short Run Equation		
COINTEQ01	-0.44021	0.180809	-2.434680	0.0209
D(GDPC)	0.670243	0.653178	1.026126	0.3128
D(INEQ)	0.408322	2.726397	0.149766	0.8819
D(PDEN)	0.717126	3.669477	0.195430	0.8463
D(UNEMP)	0.198588	0.140802	1.410414	0.1684
C	-5.879980	2.291304	-2.566215	0.0153

Source: Data Processing Results, 2025

By entering the parameter coefficients of each variable in Table 4.4., the ARDL (1,1,1,1,1) estimation model is as follows:

$$CRIME_{i,t} = -5.879980 - 1.108381GDPPC_{7,11} + 4.534412INEQ_{7,11} + 4.940074PDEN_{7,11} - 0.359763UNEMP_{7,11} + 0.670243GDPPC_{7,11} + 0.408322INEQ_{7,11} + 0.717126PDEN_{7,11} + 0.198588UNEMP_{7,11} + \varepsilon_{7,11}$$

Based on Table 4.4., it can be concluded that the partial effect of the independent variables on the dependent variable is as follows:

1. CointEq (ECT) shows significant results with a Prob. value of 0.0209 < 0.05 (α = 0.5%). Thus, it means that the Panel ARDL model has met the validity requirements.

2. The per capita GDP variable in the long term has a negative and significant effect on the crime index, with a probability value of 0.0000 < 5% and a coefficient value of -1.108381. If there is a 1% increase in per capita GDP, it causes a 1.108381% decrease in the crime index. In the short term, the GDP per capita variable has a positive and insignificant effect, with a probability value greater than alpha 10%, namely 0.3128. If the GDP per capita variable increases by 1% during that period, it will increase the crime index by 0.3128%.
3. The income inequality variable in the long term has a positive and significant effect on the crime index, where the probability value is 0.0000 < alpha 5% with a coefficient value of 4.534412. Based on these results, it is also explained that if there is a 1% increase in income inequality, it will cause an increase in the crime index of 4.534412%. In the short term, the income inequality variable has a positive but insignificant effect on the crime index in the seven ASEAN countries, with a probability value of 0.8819 > alpha 10%. This means that if the income inequality variable increases by 1% during that period, it will increase the current crime index by 0.408322%.
4. The population density variable in the long term has a positive and significant effect on the crime index, where the probability value is 0.0000 < alpha 5% with a coefficient value of 4.940074. If there is a 1 person/km² increase in population density, it will cause an increase in the crime index of 4.940074%. In the short term, the population density variable has a positive but insignificant effect on the crime index in the seven ASEAN countries, with a probability value of 0.8819 > alpha 10%. The coefficient value of 0.717126 in the test results indicates that if the population density variable increases by 1 person/km² during that period, it will increase the crime index by 0.717126%.
5. The unemployment variable has a negative and significant effect on the crime index with a probability value of 0.0000 < alpha 5% and a coefficient value of -0.35976. This indicates that if unemployment increases by 1%, it will decrease the crime index by 0.35976%. Meanwhile, in the short term, the unemployment variable has a positive and insignificant effect on the crime index in the seven ASEAN countries, with a probability value of 0.1684 > alpha 10%. The coefficient value of 0.198588 in the test results indicates that if the unemployment variable increases by 1% during that period, it will increase the crime index by 0.198588%.

4.5 Discussion

1. The Effect of GDP per Capita on Crime Index

The long-term estimation results are consistent with the hypothesis that per capita GDP has a negative effect on the crime index in seven ASEAN countries. These estimation results are in line with Gary Becker's economic theory of crime, which states that individuals make rational calculations between the benefits and costs of committing crimes. When per capita income increases, the opportunity cost of committing crimes becomes higher, so individuals tend to avoid criminal acts. Emile Durkheim's theory of anomie also emphasizes that improved macroeconomic conditions, such as an increase in per capita GDP, can reduce the economic pressures that trigger crime.

Meanwhile, the short-term estimation results do not align with the hypothesis that per capita GDP has a negative impact on the crime index in the 7 ASEAN countries in the short term. This is because the higher a person's income, the higher the risk of that person becoming a victim of theft and there is a time lag in the process of per capita GDP affecting the crime index in the short term.

2. The Effect of Income Inequality on Crime Index

The long-term estimation results are consistent with the research hypothesis, namely that the income inequality variable has a positive effect on the crime index in seven ASEAN countries in the long term. This aligns with the radical criminology theory proposed by Karl Marx and the economic determinism theory by John M. Keynes, which emphasize that income inequality arising from structural inequality not only creates social tension but also weakens overall economic stability, ultimately contributing to rising crime rates.

The short-term estimation results align with the research hypothesis, indicating that the income inequality variable has a positive impact on the crime index in the 7 ASEAN countries in the short term. This is because income inequality requires time to contribute to the crime index.

3. The Effect of Population Density on Crime Index

The long-term estimation results are consistent with the research hypothesis, namely that population density has a positive effect on the crime index in seven ASEAN countries. In line with the ecological theory proposed by Urie Bronfenbrenner and the social disorganization theory proposed by Clifford Shaw, criminal behavior is greatly influenced by various interconnected environmental factors such as population density, population mobility, urbanization, and slum settlements. An unstable social environment tends to create the potential for criminal behavior in an individual.

The short-term estimation results indicate that the research hypothesis is accepted, meaning that population density has a positive effect on the crime index. Based on these estimation results, it can also be concluded that population density does tend to contribute to an increase in crime rates due to economic pressure and intensified competition for resources; however, in the short

term, its influence is often not significant. This is due to the role of other factors such as economic growth, education, and poverty levels, which also significantly determine crime rates.

4. The Effect of Unemployment on Crime Index

The long-term estimation results do not support the hypothesis that unemployment has a positive effect on the crime index in seven ASEAN countries in the long term. The results of this study are not in line with Robert K. Merton's strain theory, which states that crime is not only the result of deviant individual characteristics, but also a response to structural injustice in society that creates tension between desired social goals and the means available to achieve them. The results of this study show that although high unemployment is often considered a factor that increases crime rates because the inability to meet basic needs can drive a person to commit crimes, in reality, high unemployment is also considered to reduce crime rates through effective government policies and law enforcement.

Short-term estimation results align with the hypothesis that unemployment has a positive impact on the crime index. In the short term, crime may emerge as a direct response to the economic pressures individuals face, where the inability to meet basic needs drives some people to commit criminal acts as a quick way to address financial difficulties. However, this influence is not overly strong and still requires support from other factors.

5. Conclusion

This study analyzes and discusses the influence of GDP per capita, income inequality, population density, and unemployment in seven ASEAN countries, leading to the following conclusions:

1. The GDP per capita variable has a negative and significant influence in the long term. In the short term, the GDP per capita variable has a positive and insignificant influence on the crime index in seven ASEAN countries.
2. The income inequality variable has a positive and significant influence in the long term. In the short term, the income inequality variable also has a positive influence, but it is not significant on the crime index in the 7 ASEAN countries.
3. The population density variable has a positive and significant influence in the long term. In the short term, population density has a positive but insignificant influence on the crime index in the 7 ASEAN countries.
4. The unemployment variable has a negative and significant influence in the long term. In the short term, the unemployment variable has a positive but insignificant influence on the crime index in the 7 ASEAN countries.

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