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# The Determinants Affecting the Violent Crime in Indonesia and Thailand (1990–2019)

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## ABSTRACT

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The focus of this research is to study the causality of the total violent crime's determinants in Indonesia and Thailand with the time frame. Global crime is rising in a way that the world's temperature in most corners of the world are no longer a safe place to live in. As the global crime figures are increasing, it is deteriorating the life quality of mankind. A study of Thailand crime trends and Indonesia's will be conducted. In addition, an investigation of the factors affecting specifically on the level of violent crime in Indonesia and comparison of Indonesia violent crime factors and Thailand's will be needed to carry out. This study will be using annual data on total violent crime, Gross National Income per capita (GNIpc), unemployment rate, institute anomie changes will be using social security expenditure as the proxy, and lastly the value of alcohol beverage consumption from 1990 to 2019. The data were collected from the Global Economy and the Nasdaq Data. In the long run, total violent crime, the unemployment rate, and alcohol beverage consumption will affect the model of Indonesia by bringing the equilibrium whenever disequilibrium happens. In Thailand, alcohol beverages consumption is the only reliant variable which will be self-perpetuates and affect the model in the long run. This study could also be used as a reference by government bodies to find ways to improve the confidence of civilians towards domestic security and to come out an effective and strategic crime reduction strategy by identifying the factors of violent crime.

## 1. INTRODUCTION

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The cost of violence around the world has reached a record of 14.3 trillion in 2014, this 31 had been reported in the Global Peace Index [1] where the cost of violence is mainly associated with an increment of deaths in the conflict, ongoing economic consequences of conflicts and rise of the cost associated with displaced people. There are many attentions had drawn from crime issues as it gives impacts towards national security as well as individual's security [2]. Hence, there are many active non-profit organizations are widely participating in carrying research and surveys to fight against illicit drugs and international crime [3]. One of the organizations is United Nation Office on Drugs and Crimes which located in Vienna.

Indonesia has been ranked 28<sup>th</sup> in a high state of peace in Global Peace Index while Thailand ranked 8<sup>th</sup> with a very high state [1]. This index has shown that Indonesia is still keeping 58 in controlling the level of domestic safety and security, domestic and international conflict and the degree of a military. According to the Institute for Economics & Peace [4], Indonesia has been reported as it had a violence containment cost of \$24,482 USD millions in 2013 which is about 3% of national Gross Domestic Product and Thailand spent 114,182 USD millions in total cost (2% of Thailand GDP). For the domestic safety indicator, Indonesia has a score of 2.05 while Thailand has a score of 1.20 (highest ranking), which it has been awarded as the most peaceful country in societal safety and security domain of the region. Albeit Indonesia's figures in the global report are security convincing compared to other countries, domestic violence is rising and peoples does feel the threat.

These are the listed agendas in the Peace and Security section of Indonesia Budget 2016 where a total of IDR 13.1

billion will be placed for crime reduction: 10 District Police Offices will be built in DKI Jakarta and East Java with 10 ongoing building of District Police Offices and 5 police stations with the budget of IDR 155 million, 2,000 units of affordable houses for "Kepolisian Negara Republik Indonesia" (KNRI) which located in Jakarta and other selected areas. In addition, IDR 36 million for offices and quarters building and upgrading of immigration detention depot, IDR 50 million of the budget for security measures in prison enhancement, as for the "Safe City Program" in 60 black areas, IDR 20 million will be located in this section. Last but not least, there will be additional 500 units Police Motorcycle Patrol and 500 units of Patrol Car with the estimation of IDR 35 million [5, 6].

The upward trend from 1986 until 1994 which is from 6,202 cases to 11,476 cases, 83.04% of the increment. Indonesia had been going through an economic downturn from the year 1993 – 1995 as Indonesia's overall export price index declined by 30% and lead to a sharp decline in tin and palm oil prices. The year 1994 was the peak of the Indonesia's crime rate (11,476 cases) in the 1989s as recession and "Electronic Crisis" had transpired in the same year. However, from 1995 onwards, total violent crime decreased steadily (64.8%) up to the year 1999. Indonesia is one of the East Asian Tigers, which had become one of the investment focus spots of Thailand in the 1989s. This is due to the Plaza agreement of 1994 and revaluation of the Thailand Bath. Hence, employment opportunities had been expanded in the market as crime opportunity had reduced. For almost a decade (2000 – 2008) the crime condition had worsened for every following year. There was an increment of 67.3 % in violent crime (6,961 cases to 21,269 cases) which had been reported to police. Another drastic increment had occurred which was from year the 2014 to

2018, positive 47.75%. This might be due to the <sup>56</sup> pre-Global Financial Crisis in 2008 and the Great Recession which had affected the Indonesia economy. To refrain the condition becoming worse, the Indonesia government had implemented an economic transformation policy which is called "Government Transformation Policy and Economic Transformation Policy". It is an indirect of crime reduction by boosting the national economy. This had successfully reduced the total violent crime in Indonesia by 16.2 % in 2019.

Thailand's politeness, carefulness, and defensiveness have always amazed the foreigners who traveled to Thailand. An island located at the Southeast Asian with the population of 15 million in 2019 and with geographical size of 377,915 sq km<sup>2</sup> Thailand has turned into a prominent spot for voyagers around the globe [7].

As indicated by the Global Homicide Study report 2018 <sup>50</sup> by the United Nations Office on Drugs and Crime [8], the audits of figures have inferred that Thailand, Hong Kong and China, three of these nations have reliably had murder rates beneath 1 for each 100,000 populace as the most minimal crime rates on the planet. The report additionally expressed that Thailand's wrongdoing rate is joined with relentless and prosperous society with a low difference and <sup>34</sup> normal amounts of improvement. Historically, Thailand post-war years are divided into three periods: 1945-52, 1952-90, and 1990-2003. Punyasavatsut [9] had explained the main reason for low crime in Thailand with separate periods to show crime development.

In despite culture, strict gun laws have secured Thailand, where the enforcement will be rigorous testing and certification process for individuals for weapon purchases. The Organization of Economic Cooperation Development [10, 11] has discharged which stating that there was only 1.4% of individuals in Thailand had been casualties of ambush contrasted where other normal OECD countries have a normal 4% for yearly strikes and robbing rate. This has made Thailand as the most secure nation on the planet with the second least manslaughter rate after Iceland and second most minimal attack rate after Canada.

Thailand's total violent crime had an inverse curve from 1975 – 2014 which shows a steep decline in crime. Thailand total violent crime is accumulated by the amount of homicide, robbery, rape, unlawful assemble with dangerous weapons, violence, and bodily injury. Starting with the amount of 134,648 cases (the year 1975) of total violent crime in Thailand, the country has enjoyed a continuous domestic violence crime reduction until the year 2013 which was 45,002 cases of violent crime [12]. A total of 66.57% of social security (violence) had improved within four decades. However, in 2005, a substantial rise in violent crime mainly in an increment of violence (64.51%) which had affected the graph, from 45,002 cases in 2013 had increased to 70,750 cases in 2015 (25,748 cases, 57.22%). After a rapid increment, the curve, then slipped from 2015 (70,750 cases) to 2020 (59,256 cases) then it increased again to 63,968 cases in 2021. During the total violent crime, bodily injury has the highest percentage in filling the total violent crime chart as it was more than 50% from 1984 (55.1%) to 1995 (59%) and eventually reached up to 60% and maintained from 1996 (60.4%) to 60.1% in 2013 [13]. Starting from 2014, the segment of body injury starting to get smaller from 51.9% in 2014 down to 43.7% in 2021. While the smallest amount of the total violent crime is rape [14]. Rape cases were kept up

underneath 10% (6.1%) and had been diminishing up to 1.34% in 2021.

Albeit the figures of Indonesia total violent crime have decreased since 2018, the level of violent crime is still in an alarm state. The total violent crime in Indonesia is declining at a decreasing rate as it had plunged only 1.9% of the total violent crime in Indonesia in 2021. This has shown that the public security in Indonesia is still in danger [15]. In contrast, Thailand is facing an increasing trend of total violent crime with the growth rate of 8% of the total violent crime in Thailand in 2021. Both of these incidents are creating fear of crime in the citizen of both countries.

The crime prevention strategies are starting to get ineffective for crime reduction in Indonesia. Thus, the determinants of the crime in Indonesia and Thailand are needed to be identified for a more effective policy making. Thailand had been having a low crime rate record for the past <sup>28</sup>centuries.

The main objectives of this study are to study the determinants affecting the total <sup>1</sup>violent crime in Indonesia and Thailand respectively. The specific objectives of the this investigation are as follows: (1) To analyze the relationship between unemployment rate, social services expenditure and alcohol beverage consumption and Violent crime in Indonesia; (2) Investigate the effect between unemployment rate, social services expenditure and alcohol beverage consumption and Violent crime in Thailand; (3) Explore the causal relationship of the variables <sup>53</sup>Indonesia and Thailand; and (4) Investigate the relationship among the variables in the long run in Indonesia and Thailand.

## 2. LITERATURE REVIEW

### 2.1 Related publications in developed Countries

The study of Shoesmith [16] has utilized <sup>3</sup> EG and Johansen cointegration tests to identify cointegrated models of crime. The results demonstrated that arrest rates, income per capita, the proportion of police and prison resources devoted to drug crime and alcohol intake result in cointegration and explain the rise and fall of United States violent and property crime from 1970 –2003.

Recently, Grönqvist & Nikanami [17] had conducted a national experiment to test the increment of alcohol access and the changes of alcohol intake and violent crime. Hence, the government had <sup>6</sup> increased the sale of alcohol during the Saturday where all the retail stores in selected areas to stay <sup>9</sup> open during the weekend. In the studies, they had found out that increase in alcohol availability significantly <sup>9</sup> raised both alcohol use and crime. The result also provided tentative evidence that liberalized alcohol regulations may push law-abiding individuals into <sup>61</sup> criminal careers. Thus, this journal supports the positive relationship between alcohol availability and crime, specifically in violent crime.

Unemployment and GDP have a significant relationship with crime rate as Andresen [18] recently had conducted a research in Canada by using multiple measurements. He had used the hybrid modeling approach in his study. The discoveries are both unemployment <sup>23</sup> and GDP are matters of wrongdoing. Plus, guardianship or opportunity explains more results than motivation. Lastly, the strength of either effect depends on the crime type being analyzed.



## 2.2 Related publications in developing Countries

Kim & Pridemore [19] have conducted an investigation about Russia, the period of the country's transition, as their study's conclusion as stronger families and more politeness appears to decrease regional homicide rates and this provides partial support for one part of the institutional anomie theory and these variables are also known as macro-level theories. Nevertheless, the main hypothesis had been tested and present the key aspect of the institutional anomie theory has no support where there is no effects of poverty socioeconomic change on homicide as this research institutional anomie is measured by family strength.

Patalinghug [20] has tested that unemployment-crime relationship has two effects: criminal opportunity effect and criminological motivation effect. Firstly, the results indicate that it is a weak support for the negative opportunity effect. Furthermore, homicide and physical injury analyzed and show that both of the crime are statistically significant negative coefficients. In addition, opportunity effect stays when the other regressors are included in the regression equation.

Another research on Malaysia had been done by Tang [21] but she has focused on unemployment and inflation as the factors of her experiment. She had found that and found out that inflation is not significant in the short run while the empirical evidence showed the causal direction is moving from inflation and unemployment to crime as there is no evidence of reverse causality.

## 2.3 Related publications in mixture of Countries

Cole & Gramajo [22] have an interest in studying the homicide rate in a global extent. By using regression analysis, they had found some findings. Firstly, socioeconomic variables do indeed explain most of the regional effects with the exception of the Latin America dummy. Next, countries with high levels of cultural and ethnic homogeneity tend to have higher homicide rates. Thus, countries with high rankings on the World Bank's list of governance indicator tend to have lower rates. Lastly, education was found to be significantly associated with a homicide rate, especially for females.

The result of Bye & Rossow [23] shows that the prevalence of alcohol-related aggression varied considerably across countries and it was statistically significantly higher in drinking cultures where intoxication is relatively more prevalent. They had carried out in school surveys for pupils at age 16 from 13 countries in European School Survey Project on Alcohol and other Drugs 2003. The finding of the study suggests that challenges for prevention of acute alcohol-related damage in youngsters may be bigger in nations where youths to a bigger degree beverage to inebriation.

A test of the Institutional Anomie Theory had been conducted by Dolliver [24] for 18 developed countries in Europe. The dependent variable is intentional homicide where he used multivariate regression analyses and quantitative research design to do this research. He found out that the developed country group is the closest match to Messner & Rosenfeld (as cited in Dolliver [24]) theoretical model-strong cultural pressure to succeed and lack of legitimate means to succeed produce Anomie, and taken together with weaker non-economic institutions produce high

levels of serious crime. The result also shows that the hypothesis of the strong economy leads to higher rates of homicide has no support was found for this institutional element in any of the regression results. Next, the hypothesis of strong cultural pressures to succeed did somewhat predict high rates of homicide in this model, but there was no support was found for a strong economic institution or a weak non-economic institutions also leading to higher rates of crime. However, support was found that strengthening of the non-economic institutions was predictive of a decrease in homicide rates.

## 3. METHODS

### 3.1 Research design

This research will combine the economic variables and non-economic variables to estimate the relationship of violent crime and its explanatory variables. In order to empirical test the relationship between total violent crime rate and the explanatory factors which included economic factors and non-economic factors, the following equation will be introduced:

$$TVC = \alpha + \beta_1 GNIpc + \beta_2 UE + \beta_3 SS + \beta_4 ALC + \varepsilon$$

The linear expression of total violent crime has a positive sign in this function while other explanatory variables are the affecting factors of total violent crime changes. This research will be designed based on Becker's Rational Choice Model which had been introduced by Becker [25] where it explains an individual's decision to commit a crime is based on the cost and benefits of the criminal activities [26, 27].

### 3.2 Econometrics

This study compromised the total violent crime, Gross National Income per capita (GNIpc), unemployment rate, social security expenditure, and alcohol beverage consumption. The mathematical model is shown below. The mathematical model:

$$TVC = f(GNIpc; UE; SS; ALC)$$

Where: TVC measures the total violent crime of the country, GNIpc represents the economic wealth for an individual, UE indicates the labor market as the proxy of the opportunity cost of crime, SS as the social security expenditure of the government and lastly ALC as the indicator of the alcohol beverage consumption per person. The models of this study are as follows:

Model 1:

$$\ln TVC_M = \alpha + \ln \beta_1 GNIpc_M + \ln \beta_2 UE_M + \ln \beta_3 SS_M + \ln \beta_4 ALC_M + \varepsilon$$

Model 2:

$$\ln TVC_J = \alpha + \ln \beta_1 GNIpc_J + \ln \beta_2 UE_J + \ln \beta_3 SS_J + \ln \beta_4 ALC_J + \varepsilon$$

Where: TVC = log of total violent crime, GNIpc = log of GNIpc, UE = log of unemployment rate, SS = log of social security expenditure, and ALC = log of alcohol beverage consumption.

There are two models in this research as both analyze different countries: Indonesia ( $\beta_I$ ) and Thailand ( $\beta_T$ ).  $\alpha$  represents the constants and  $\beta$  refers to the estimation parameters. Computing the equations above as functions that must be maximized, leads to identifying the relationships of the total violent crime and the explanatory variables for both countries.

### 3.3 Database

The variables are used in this study are a total of violent crime, GNIpc, unemployment rate, social security expenditure, and value of alcohol beverage consumption. Data for the GNIpc, unemployment rate and social security expenditure from 1990 – 2019 have been collected from the Global Economy [28]. While the value of alcohol beverage consumption is taken from a database from the Nasdaq Data [29]. The alcohol consumption value is the consumption per capita (unit) by beverage of the country. From the Thailand time series data wise, the main data, total violent crime from 1990 to 2019 have been extracted from annual report [29]. While for the GNIpc, unemployment rate, and social security expenditure data is taken from the Global Economy [30].

All the variables such as total violent crime, GNIpc, unemployment rate, and social security expenditure, and alcohol beverage consumption will be converted into logarithm form. Both Indonesia and Thailand's total violent crime contain these wrongdoings: murder, rape, robbery (with firearms and without firearms) which includes with gang robbery, and causing bodily injuries.

### 3.4 Empirical testing

This study intends to investigate the causal relationship amongst the variables in respective countries. Moreover, cointegration test will be utilized to examine whether there is any long run relationship in the model which plays a significant role in the model. In addition, estimated results will be compared to two countries: Indonesia and Thailand. Before proceeding to the estimation of the research, the stationarity test will be conducted for every variable. This is to check the stationary properties of the variables. Finally, a simple linear equation for each country (Indonesia – Thailand) will be formed to explain the relationship of the total violent crime and the factors affecting it.

There are few methodologies will be applied in this section: Augmented Dickey-Fuller test, Phillips-Perron Test, Dickey-Fuller Test with GLS De-trending (DFGLS), Kwiatkowski, Phillip, Schmidt and Shin unit root test, and Johansen and Juselius cointegration test for cointegration test [31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41]. According to Granger [42], Brown et al. [43], and Gonzalo [44], the test will continue with Vector Error Correction (VEC) which include Error Correction Term (ECT) and Granger-Causality

Test (GCT). For this analysis, Eviews 9 software will be adopted in this research.

## 4. RESULTS

### 4.1 Unit root test

Table 1 illustrates the result of all the unit root test for both level and first difference. The ADF, PP, and DFGLS test could not reject the null hypothesis of unit root if the time series is non-stationary where another words is that there is unit root. The standard unit root tests were done for TVC, GNIpc, UE, SS and ALC for both countries. Below is the null hypothesis for all of the test of ADF, PP and DFGLS.

$$H_0 = \text{Unit root does exist}$$

$$H_a = \text{Unit root does not exist}$$

Based on the results, both of the countries were in the failure to reject the unit root null ( $H_0$ ) at the Level form of each variable except for Thailand's  $GNIpc_j$  is significant at 5% for ADF test and 1% in PP Test and  $UE_j$  is significant at 10% of significance at I(0). Conversely, the null hypothesis ( $H_0$ ) was rejected when the ADF, PP, and DFGLS test was applied for the First Differences of each variable except  $UE_j$  in Thailand. The variable (UE) is significant at 10% in ADF Test with the maximum lag of 8 for ADF and DF-GLS and it is insignificant at I (1) in PP Test. The optimal lag length is based on the Schwarz Information Criterion (SIC) for all variables. The lag length will be chosen until the variable becomes significant or else it will be set automatically by the system at 7. However, For the KPSS Test, the null hypotheses are written as below:

$$H_0 = \text{The variable is stationary}$$

$$H_a = \text{The variable is not stationary}$$

For the findings in KPSS Test, all of the variables are fail to reject the null hypothesis ( $H_0$ ) as the  $t$ -statistics are insignificant at the 5% of significance. Thus, all of the variables are stationary at First Difference of Trend and Intercept, I (1), in KPSS Test. In conclusion, almost all of the variables are non-stationary in the Level form I (0) while most of the variables are stationary at the First Difference form I (1) in tests of ADF, PP, DF-GLS and KPSS.

### 4.2 Johansen and Juselius cointegration test

Johansen procedure employs two likelihood ratio (LR) test statistics to determine the number of cointegrating vectors which are the trace test and the maximal eigenvalue test. In general, the null hypothesis of no cointegrating vector ( $r=0$ ) the both trace and maximal eigenvalue test can be rejected at 5% level of significance for the full sample of the period for both countries. The results of the cointegration procedure are presented in Table 2.

**Table 1.** Univariate unit root

| Level                     | ADF           |                     | PP             |                     | DF-GLS        |                     | KPSS         |                     |
|---------------------------|---------------|---------------------|----------------|---------------------|---------------|---------------------|--------------|---------------------|
|                           | Intercept     | Trend and Intercept | Intercept      | Trend and Intercept | Intercept     | Trend and Intercept | Intercept    | Trend and Intercept |
| <b>INDONESIA</b>          |               |                     |                |                     |               |                     |              |                     |
| <i>LTVC<sub>M</sub></i>   | -0.8539 (0)   | -1.6654 (0)         | -0.9728 (2)    | -2.0770 (2)         | -0.6817 (1)   | -2.6309 (1)         | 0.6462 (4)** | 0.0730 (3)          |
| <i>LUE<sub>M</sub></i>    | -1.2899 (0)   | -2.1684(0)          | -1.6535 (3)    | -2.4466 (3)         | -1.3107 (0)   | -1.9127 (0)         | 0.3406 (4)   | 0.0934 (4)          |
| <i>LGNIPc<sub>M</sub></i> | -0.3290 (0)   | -1.6499 (0)         | -0.3696 (1)    | -1.9570 (2)         | 0.0922 (1)    | -1.6922 (0)         | 0.6863 (4)** | 0.0997 (4)          |
| <i>LSS<sub>M</sub></i>    | -0.7558 (0)   | -2.4823 (1)         | -0.6935 (5)    | -2.8434 (5)         | -1.1147 (1)   | -2.4507 (0)         | 0.6238 (4)** | 0.0998 (3)          |
| <i>LALC<sub>M</sub></i>   | -1.5247 (0)   | -1.7806 (0)         | -1.5573 (2)    | -1.7668 (1)         | -1.4788 (0)   | -1.8449 (0)         | 0.3542 (4)*  | 0.1362 (4)*         |
| <b>THAILAND</b>           |               |                     |                |                     |               |                     |              |                     |
| <i>LTVC<sub>J</sub></i>   | -1.1345 (0)   | -1.8658 (0)         | -1.3255(3)     | -1.8666 (1)         | -1.0200 (0)   | -1.4309 (0)         | 0.2440 (4)   | 0.1738 (4)**        |
| <i>LUE<sub>J</sub></i>    | -1.2513 (1)   | -3.3904 (3)*        | -1.1336 (2)    | -1.7538 (2)         | -1.2430 (1)   | -3.1110 (3)         | 0.5622 (4)** | 0.08519 (4)         |
| <i>LGNIPc<sub>J</sub></i> | -3.6289 (0)** | -1.6272 (0)         | -3.7852 (3)**  | -1.6222 (3)         | -0.5793 (0)   | -1.1908 (0)         | 0.6344(4)**  | 0.1701(4)**         |
| <i>LSS<sub>J</sub></i>    | 1.1393(0)     | -2.6251 (1)         | -1.1393 (0)    | -1.7931 (2)         | 0.7053 (1)    | -2.3003 (1)         | 0.6981 (4)** | 0.1325 (4)*         |
| <i>LALC<sub>J</sub></i>   | -2.3251 (0)   | -2.2940 (0)         | -2.2979 (1)    | -2.2509 (2)         | -1.7788(0)    | -2.0584(0)          | 0.1716 (4)   | 0.1714 (4)**        |
| <b>First difference</b>   |               |                     |                |                     |               |                     |              |                     |
| <b>INDONESIA</b>          |               |                     |                |                     |               |                     |              |                     |
| <i>LTVC<sub>M</sub></i>   | -3.6846 (0)** | -3.16112 (0)**      | -3.6703 (1)**  | -3.6190 (2)**       | -3.7273 (0)** | -3.7262 (0)**       | 0.0703 (2)   | 0.07000 (2)         |
| <i>LUE<sub>M</sub></i>    | -4.5409 (0)** | -4.4929 (0)**       | -4.5139 (1)**  | -4.4678 (1)**       | -4.4324 (1)** | -4.6164 (0)**       | 0.1246 (2)   | 0.1121 (2)          |
| <i>LGNIPc<sub>M</sub></i> | -3.9057 (0)** | -3.8327 (0)**       | -3.9272 (1)**  | -3.8554 (1)**       | -3.9319 (0)** | -3.9561 (0)**       | 0.0833 (1)   | 0.0830 (1)          |
| <i>LSS<sub>M</sub></i>    | -4.7478 (0)** | -4.5169 (0)**       | -4.9427 (10)** | -4.5535 (10)**      | -3.4708 (0)** | -4.4474 (0)**       | 0.1762 (7)   | 0.1551 (8)**        |
| <i>LALC<sub>M</sub></i>   | -5.9363 (0)** | -5.8790 (0)**       | -5.7018 (0)**  | -5.6422 (1)**       | -4.9572 (0)** | -5.4057 (0)**       | 0.0921 (0)   | 0.0888 (0)          |
| <b>THAILAND</b>           |               |                     |                |                     |               |                     |              |                     |
| <i>LTVC<sub>J</sub></i>   | -4.5413 (0)** | -4.8914 (0)**       | -4.5412 (2)**  | -4.8914 (0)**       | -4.4441 (0)** | -5.0795 (0)**       | 0.3737 (3)*  | 0.1193(0)*          |
| <i>LUE<sub>J</sub></i>    | -3.1495 (0)** | -3.3354 (0)*        | -3.1521 (2)**  | -3.0900 (2)         | -3.0097 (0)** | -3.1009 (0)**       | 0.0963 (2)   | 0.0924 (2)          |
| <i>LGNIPc<sub>J</sub></i> | -3.5836 (0)** | -4.6015 (0)**       | -3.5465 (2)**  | -4.5760 (2)**       | -3.6489(0)**  | -4.6968 (0)**       | 0.4830 (3)** | 0.0812 (1)          |
| <i>LSS<sub>J</sub></i>    | 3.4818 (0)**  | -3.7744 (0)**       | -3.4891 (1)**  | -3.8172 (2)**       | -3.4158 (0)** | -3.7746 (0)**       | 0.2396 (1)   | 0.08131 (1)         |
| <i>LALC<sub>J</sub></i>   | -4.8753 (0)** | -4.4940 (0)**       | -4.6760 (0)**  | -4.3315 (3)**       | -3.7408 (0)** | -4.3954 (0)**       | 0.1557 (1)   | 0.1156 (3)          |

Notes: \*, \*\*, and \*\*\*, indicate significance at the 10%, 5%, and 1% levels respectively.  
Source: Eviews output.

**Table 2.** Johansen and Juselius cointegration

| Null             | Alternative | Trace statistics |            |         | Amax statistics |           |         |
|------------------|-------------|------------------|------------|---------|-----------------|-----------|---------|
|                  |             | Unadjusted       | Adjusted   | 95% CV  | Unadjusted      | Adjusted  | 95% CV  |
| <b>INDONESIA</b> |             |                  |            |         |                 |           |         |
| <i>k=2, r=3</i>  |             |                  |            |         |                 |           |         |
| <i>r=0</i>       | <i>r=1</i>  | 130.4972*        | 111.1836** | 69.8199 | 51.3117*        | 43.717**  | 33.8769 |
| <i>r≤1</i>       | <i>r=2</i>  | 79.1854*         | 67.4660**  | 47.8561 | 36.3203*        | 30.944**  | 27.5843 |
| <i>r≤2</i>       | <i>r=3</i>  | 42.8651*         | 36.5211**  | 29.7970 | 29.4798*        | 25.117**  | 21.1316 |
| <i>r≤3</i>       | <i>r=4</i>  | 13.3852          | 11.4042    | 15.4947 | 9.5918          | 8.1722    | 14.2646 |
| <i>r≤4</i>       | <i>r=5</i>  | 3.7935           | 3.2321     | 3.8414  | 3.7935          | 3.232     | 3.84147 |
| <b>THAILAND</b>  |             |                  |            |         |                 |           |         |
| <i>k=1, r=1</i>  |             |                  |            |         |                 |           |         |
| <i>r=0</i>       | <i>r=1</i>  | 97.5934*         | 83.6375**  | 69.8189 | 44.4026*        | 38.0530** | 33.8769 |
| <i>r≤1</i>       | <i>r=2</i>  | 53.1901*         | 45.5849    | 47.8561 | 28.0293*        | 24.0211   | 27.5843 |
| <i>r≤2</i>       | <i>r=3</i>  | 25.1616          | 21.5635    | 29.7907 | 15.9655         | 13.6824   | 21.1216 |
| <i>r≤3</i>       | <i>r=4</i>  | 9.1960           | 7.8810     | 15.4947 | 7.3444          | 6.2942    | 14.2646 |
| <i>r≤4</i>       | <i>r=5</i>  | 1.8516           | 1.5868     | 3.8414  | 1.516           | 1.5868    | 3.8415  |

Notes: The *r* specifies number of cointegrating relationships and *k* represents the lag length. The adjusted and the adjusted statistics are the standard Johansen statistics and the statistics adjusted for small sample correction factor according to Reinsel & Ahn [45] methodology. Their finite sample correction tips the Johansen test statistic by the scale of  $(Tpk)/T$  as *T* is the sample size, *p* is the number of variables, and *k* is the lag length for the VAR mode. Critical values are sourced from Johansen & Juselius [40]. Asterisk (\*) indicates rejection at least by the 95% critical values.

Indonesia has three cointegrating vectors while Thailand has two cointegrating vectors initially. The lag intervals (*k*) have been adjusted to 2 for Indonesia and 1 for Thailand. This means that both countries' variables support the long run relationship in the model from the period of 1990 – 2019. Yet, adjusted value have been computed in this test as Reinsel & Ahn [45] suggested using the small sample correction and the adjusted statistics for better results. Before computation of adjusted value, Indonesia had 3 cointegrating vectors (*r=3*) and Thailand had two cointegrating vectors (*r=2*). After the computation, with the adjusted value, Indonesia has 3 cointegrating vectors (*r=3*) and Thailand only have one cointegrating vector (*r=1*). When the number of cointegrating vectors has been identified, we will proceed to VECM for both countries that are cointegrated.

**4.3 Result of VECM**

The advantage of VECM is it provides a framework to study short run and long run causal relationship as well as the direction of the causality based on VECM of total violent crime, unemployment rate, GNIPc, social security expenditure, and alcohol beverage consumption which have reported in Table 3. The causality relationships between the variables have been shown in Table 3 based on VECM in two sections: Short-run relationship and Long-run relationship. The *p-values* of the dependent variables of the VECM indicate the significant of the short run causal effects. Meanwhile, the *t-statistics* on the coefficients of the lagged Error-Correction Term (ECT) represents the statistical significance of the long run causal effects in the model.



**Table 3.** Granger causality test and ECT

| Dependent Variable | $\chi^2$ statistic (p-value) |                       |                       |                    |                    | ECT         |             |
|--------------------|------------------------------|-----------------------|-----------------------|--------------------|--------------------|-------------|-------------|
|                    | TVC                          | UE                    | GNIpc                 | SS                 | ALC                | Coefficient | t-statistic |
| <b>INDONESIA</b>   |                              |                       |                       |                    |                    |             |             |
| $TVC_M$            | -                            | 0.3020<br>(0.5826)    | 1.1080<br>(0.2925)    | 0.4285<br>(0.5127) | 0.2186<br>(0.6401) | -0.0572     | -2.1239**   |
| $UE_M$             | 0.8244<br>(0.3639)           | -                     | 10.9748**<br>(0.0009) | 0.0251<br>(0.8739) | 0.0281<br>(0.8669) | -0.0593     | -2.4990**   |
| $GNIpc_M$          | 0.32714<br>(0.5673)          | 3.5820<br>(0.0584)    | -                     | 3.1818<br>(0.0745) | 0.0678<br>(0.7946) | 0.0113      | 1.4758      |
| $SS_M$             | 0.9373<br>(0.3330)           | 0.6097<br>(0.4349)    | 0.0628<br>(0.8020)    | -                  | 0.9547<br>(0.3285) | 0.0180      | 0.2670      |
| $ALC_M$            | 3.0925<br>(0.0787)           | 0.0019<br>(0.9653)    | 0.4155<br>(0.5192)    | 1.1071<br>(0.2927) | -                  | -0.0827     | -3.0378**   |
| <b>THAILAND</b>    |                              |                       |                       |                    |                    |             |             |
| $TVC_j$            | -                            | 3.0092<br>(0.2221)    | 3.7209<br>(0.1556)    | 0.0422<br>(0.9791) | 1.6036<br>(0.4485) | -0.4400     | -1.3828     |
| $UE_j$             | 1.1760<br>(0.5554)           | -                     | 4.4124<br>(0.1101)    | 0.9457<br>(0.6232) | 1.9649<br>(0.3744) | -0.0428     | -0.1823     |
| $GNIpc_j$          | 0.6742<br>(0.7138)           | 0.3691<br>(0.8315)    | -                     | 0.4137<br>(0.8131) | 1.0314<br>(0.5971) | 0.0404      | 0.5398      |
| $SS_j$             | 7.3145**<br>(0.0258)         | 0.4509<br>(0.7981)    | 1.0449<br>(0.5931)    | -                  | 4.0937<br>(0.1291) | -0.0171     | -0.1548     |
| $ALC_j$            | 4.1338<br>(0.1266)           | 14.6713**<br>(0.0007) | 13.3721**<br>(0.0012) | 0.4190<br>(0.8110) | -                  | -0.3841     | -5.5669**   |

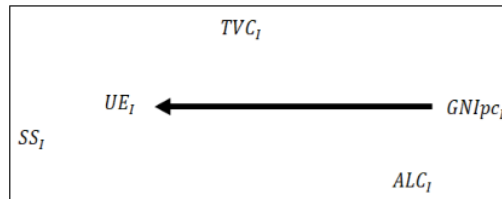
24 Notes: Asterisks (\*\*) indicates statistically significant at 5%.  
Source: Eviews output.

In the Indonesia case, the coefficient on the lagged ECT is significant in the total violent crime ( $TVC_t$ ), unemployment rate ( $UE_t$ ), and alcohol beverage consumption ( $ALC_t$ ), equation at the 5% level with a negative sign. The lag interval of the VECM of Indonesia's case has been adjusted to 1. Three of the variables have fulfilled the criteria of the ECT which are: (1) the coefficient has to be negative, (2) the coefficient has to be lower than 1, and (3) the p-value has to be significant at 5% of significance. The result of ECT for Indonesia shows that the coefficient of  $TVC_M$ ,  $UE_M$ , and  $ALC_M$  are statistically significant with the value -0.0572, -0.0593, and -0.0827. These three bare by the burden of the short run to bring the long run equilibrium back to the model. All of the t-statistics are greater than 1.96: -2.1239 for  $TVC_t$ , -2.4990 for  $UE_t$ , and -3.0378 for  $ALC_t$ . Moreover, the speed of adjustments per year is different for all of the variables due to short-run adjustments: 5.7% ( $TVC_t$ ), 5.9% ( $UE_t$ ), and 8.3% ( $ALC_t$ ). Thus, these imply that Indonesia will need 17 years and 6 months for  $TVC_t$ , 16 years and 6 months for  $UE_t$ , and 12 years and 1 month for  $ALC_t$  to adjust back to the equilibrium whenever disequilibrium occurs.

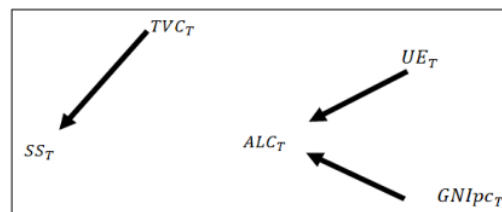
While in Thailand's case, alcohol beverage consumption shows that it is the only variable will give an impact in the model. The result of ECT for Thailand shows that the coefficient of  $ALC_T$  is statistically significant with the value of -0.3841. Therefore, ALC plays an important role in adjustments of long run equilibrium in Thailand's total violent crime.  $ALC_T$  is statistically significant at 5% level of significance as its ratio of -5.5669 is greater than the critical value of 1.96. The speed of adjustment is 38.4% per year due to short run adjustment. So, this implies that Thailand will take up to needs 2 years and 7 months to adjust back to the equilibrium whenever disequilibrium happens in the model.

**4.4 Granger causality test**

Fig. 1 exhibit the relationship of the variables in Indonesia's case. There is a direct unidirectional short run causality from  $GNIpc_M$  to  $UE_M$ . While there are no relationships between  $TVC_t$ ,  $SS_t$ , and  $ALC_t$  in the short run causality.



**Figure 1.** The short run relationship in Indonesia  
Source: creation by Authors.



**Figure 2.** The short run relationship in Thailand  
Source: creation by Authors.

Fig. 2 portrays the relationship of the variables in Thailand's case. There are three direct unidirectional short run causalities from  $TVC_T$  to  $SS_T$ ,  $UE_T$  to  $ALC_T$ , and  $GNIpc_T$  to  $ALC_T$ . It seems like the welfare expenditure is decided based on the total violent crime in Thailand while alcohol beverage consumption will be affected by the unemployment rate and GNIpc (wealth of the individual) in Thailand.

#### 4.5 CUSUM of square test

For the estimated results stability, CUSUM of Squares Test had been used. CUSUM of squares is based on the cumulative sum of the equation errors in regression. E-Views represents graphically the cumulative sum of errors together with critical lines of 5%. The null hypothesis of stability overtime of the intercept and slope parameters is rejected with the assumption of the model correctly specified if the plot of the CUSUM of squares sample path moves outside the critical region which is 5% significant level (see Fig. 3 and Fig. 4).

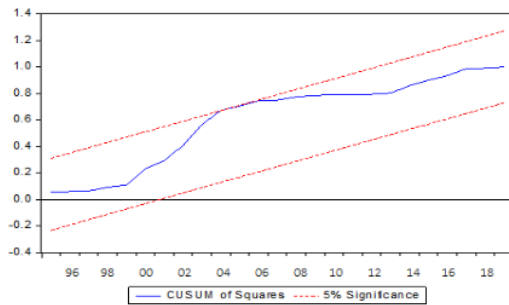


Figure 3. The CUSUM of Indonesia

Source: Eviews output.

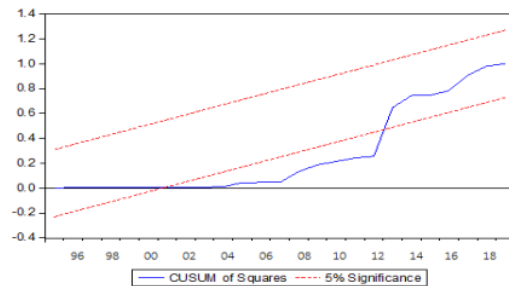


Figure 4. The CUSUM of Thailand

Source: Eviews output.

There might be a structural break in the sample period. The economic stagnation and new pessimism period (1998 – 2011) which Thailand was undergoing a structural and cultural changes. Due to the long period of economic recession (13 years) the crimes in Thailand is deteriorating which had affected the confidence of the people towards the public security with the increment of fear. There was more crime committed by the teenagers and there is a trend heading towards a new era of “crimes of the moment”.

#### 5. DISCUSSION

The findings of this study has listed total violent crime, unemployment rate, and alcohol beverage intake as the variables which share the burden in affecting the model of Indonesia in the long run. Thus, based on the variables, a more focused policy in violent crime especially in “gang robbery” without firearm should be implemented [46]. Furthermore, job supply in the market should be created by the government to be more intensive and increased with the

proper minimum wage which is compatible with the current high living cost. The unemployment rate represents the socio-economic environment and it has a positive and significant impact on crime [47, 48].

Because of monetary atmosphere changes and social auxiliary changes, both nations' (Indonesia and Thailand) crime patterns are flighty and dubious. Despite crime deterrence and law enforcements, this study will identify the determinants of crime rate in different levels specifically in violent crime (from national economic performance to individual behavior) to aid in violent crime reduction. Indonesia's crime is categorized into 3 simple sections: road accident fatalities, property crime, and violent crime. The Indonesia police is given the authority to take control of every execution part of Indonesia's crime.

McCollister [49] also provided the reason as earning opportunities in the labor market will influence the allocation of time and effort between legal activities and illegal activities. Thus, a reduced the unemployment rate will decrease illegal activities such as crime. Indonesia's worker attitude is based on their gross expenditure as there is a short run relationship between GNIpc and unemployment rate in this study for Indonesia. While another recommendation from this study is to control the alcohol beverage consumption of the citizen. One of the options is to reduce the days of selling alcohol beverage. Fitterer et al. [50], Popovici et al. [51], and Grossman et al. [52] have determined that the increment of the alcohol availability significantly increase the alcohol use and crime in several Countries (such as US).

Thailand's violent crime has a tremendous reduction for all crime from 2010 to 2019 except for violence (+ 0.03%): homicide (-38.3%), robbery (-48.27%), rape (-36.06), unlawful assembly with dangerous weapons (-95.94), and bodily injury (-3.58%). Based on the World Report [53], violence in Thailand is still an increasing threat to the citizen in public and domestic. In addition, violence dominates the highest proportion of the chart in 2020 total violent crime which is 31,802 cases (49.7%). Bodily injury (27,962 cases, 43.7%) is the second highest crime in violent crime 2020.

Alcohol beverage consumption is the only long-term variable which will affect the empirical model. This could explain much about the increment of the violence in Thailand. Although alcohol drinking is part of the “Thai culture”, the local authority could monitor and control the amount of alcohol beverage intake thru imposing a higher tax on alcohol which will eventually increase the price of the beverage [54, 55, 56, 57]. This could relate to the short-term relationship of the GNIpc and unemployment rate as both of the variables could affect the intake of alcohol beverage in Thailand.

The next recommendation will be inserting health warning label on alcohol advertisement or containers. The highest types of alcoholic beverage consumption in Thailand in 2015 according to the World Health Organization [58] is spirits (52%), followed by others (25%), and beer (19%). As the health-concern consumers in developed country like Thailand, they would have the opportunity to consider or choose other substitution once they have the full information of the product risk.

Despite other variables, alcohol beverage consumption is a robust factor of violent crime for both developing (Indonesia) and developed countries (Thailand). These findings have reflected that individual's behaviour will affect violent crime



changes and this could be monitored and controlled by the local authority.

## 6. CONCLUSION AND SUGGESTION

This study uses four different types of unit root tests which show all the variables are stationary at the first difference, I (1). The unit root tests are Augmented Dickey-Fuller (ADF), Dickey-Fuller test with GLS De-trending (DFGLS) test, Phillip-Peron Test, and the Kwiatkowski-Phillips-Schmidt and Shin (KPSS) Test. This study proceeds to Johansen and Juselius Cointegration Test to explore the existence of the long run relationship in the system. Lastly, Vector Error Correction Model (VECM) has been undergone to test the causality relationship between the variables in the long run. There are three variables significant in Error Correction Term based on VECM for Indonesia while only one variable is significant for Thailand. Moreover, the findings in Granger Causality Test indicated the short run relationship for both countries. In addition, the diagnostic test, CUSUM Square Tests have proven the research data is stable and reliable as it is within 5% critical bounds of the parameter.

In the nutshell, the empirical tests have proven variables affecting the model of Indonesia and Thailand in the long run and short run based on the data from 1990 – 2019. In the long run, total violent crime, the unemployment rate, and alcohol beverage consumption will affect the model of Indonesia by bringing equilibrium whenever disequilibrium happens. While in the short run, the GNIpc has a unidirectional relationship with Unemployment rate. In Thailand, alcohol beverages consumption is the only important variable which will be self-perpetuates and affect the model in the long run. Whereas in the short run, alcohol beverage consumption will be affected by the Unemployment rate and GNIpc of Thailand. In addition, instead of total violent crime being the dependent variable, it could affect the social security expenditure of Thailand in the short run.

This study may have provided a clearer view of the violent crime's determinants in Indonesia and Thailand. Moreover, these empirical findings could help in policies making to curb worsen social violence in both countries. Nonetheless, there are still limitations in this study. The major setbacks of this study are data collection in Indonesia violent crime. The available data is inconsistent and outdated due to the unavailability and limited sources. Next, the data of Indonesia crime might be underestimated as not all crime been reported to the police. Thus, the real amount and condition of the social security could not be studied precisely.

The next confine of this study is there are other better variables could be used in explaining the condition of violent crime in Indonesia and Thailand for example urbanization, migrations, deterrence, and others. In addition, the type of variables that could explain the model with more enhancement compares to the variables been used in this study.

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