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The Economic of Deterrence: A Wrong Policy or A Misplaced Strategy?

(Ekonomi Pencegahan Jenayah: Kesilapan Polisi atau Ketidaktepatan Strategi?)

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ABSTRACT

This paper investigates the impact of economics conditions and deterrence variables on disaggregated crime data in Sarawak, using yearly time-series data spanning more than 40 years using a vector error correction estimates. It is proven that economic variables studied serve as motivation of crime in Sarawak and imprisonment does not deter crime in the time period studied. It is evident that imprisonment in the case of Sarawak is less influential in deterring crime or the society were ill informed of the severity of punishment. While the study established a long-run relationship between economics and crime, it is also a noble approach in understanding deterrence in the context of Sarawak. Both economics and deterrence variables are important in explaining the decline in crime and in formulating efficient strategy and policies to combat crime. Government should shift the focus of increasing number of police force to increasing awareness on severity of punishments. At the same time, increasing opportunity for legal jobs would be important to deter crime.

Keywords: Sarawak; crime; deterrence; economics of crime; cointegration

ABSTRAK

Artikel ini mengkaji kesan pemboleh ubah ekonomi dan pencegahan jenayah terhadap data jenayah dis-agregat di Sarawak sepanjang tempoh 40 tahun dengan menggunakan model vektor pembetulan ralat. Dapatan kajian membuktikan bahawa pemboleh ubah ekonomi merupakan motivasi untuk seseorang terlibat dengan aktiviti jenayah. Pemenjaraan juga didapati tidak dapat mencegah jenayah kerana masyarakat tidak mempunyai maklumat yang mencukupi mengenai kekerasan sesuatu hukuman yang dijalankan. Kedua-dua pemboleh ubah ekonomi dan pencegahan jenayah merupakan pemboleh ubah penting dalam menjelaskan perubahan kadar jenayah dan untuk mencapai strategi pencegahan jenayah yang efisien. Kerajaan seharusnya mengutamakan pendedahan orang awam terhadap kekerasan sesuatu hukuman berbanding dengan memberi tumpuan kepada peningkatan petugas polis. Pada masa yang sama, meningkatkan jumlah pekerjaan juga merupakan faktor yang penting untuk mengurangkan kadar jenayah supaya masyarakat mempunyai pilihan untuk melibatkan diri dalam aktiviti pekerjaan yang sah berbanding dengan aktiviti jenayah.

Kata kunci : Sarawak; jenayah; pencegahan jenayah; ekonomi jenayah; kointegrasi

INTRODUCTION

Our present form of punishment and sentences has failed to achieve results. Public outcry on the increase in crime is heard daily. Political will to carry out reforms is a must. We must act now to review of our Criminal Justice System (Sithambaram 2005). He proposed that punishment should focus on rehabilitation as a form of new law enforcement strategies to help offenders gain social confidence when they completed their punishments. Currently, Malaysia use eclectic approach in sentencing with no fixed aims in advance before a punishment is meted out. The main aims of sentencing are deterrence, rehabilitation, prevention and retribution or some combinations of it with the proviso that it serves to protect society. An effective punishment should successfully deter crime and reduce the pattern of recidivism. However, crime can also decrease if current punishment and crime control policy deter potential criminals from engaging in crime activities. Deterrence should focus on deterring any future criminals from early prevention programs such as increase number of police patrol, targeting hotspot areas, educating people or having safe neighbourhood program. Kahan (1998) argued that early prevention is more effective because expected punishment will allow criminals opportunity to plan a strategy to escape punishment. Imai and Krishna (2004) also proved the efficiency of early prevention in

their paper focusing on employment opportunities as the early prevention strategies.

Economics venture into crime and punishment started with Becker's (1968) seminal paper which was then expanded in terms of both theoretical model and empirical analysis (Block & Heineke 1975; Ehrlich 1973, Witte 1980). The economics of crime notion stated that, an individual decision to commit crime depends on the expected payoffs of the criminal activity, the return to legal labour-market activity, tastes and the costs of criminal activities such as the likelihood of apprehension, conviction and punishment (see Chiricos 1987; Freeman 1983; Long & Witte 1981; Nagin 1978 for detailed review). Although there are arguments that perceived sanctions should be used in order to have a valid test of the model (Piliavin et al. 1986), Heineke (1988) claimed that both actual and perceived sanctions would yield to the same qualitative results. Till date, mixed results were provided from past researches on the deterrence effect of punishment. Some evidence significantly supports the deterrence effect (Ehrlich 1975; Grogger 1991; Layson 1985; Levitt 1997; MacDonald et al. 2016; Witte 1980) while other found a weak or positive relationship between crime and current punishments (Cornwell & Trumbull 1994; Cover & Thistle 1988; Harcourt & Ludwig 2006; Myers 1983; Rosenfeld et al. 2007).

One of the most serious problems is that punishment is expensive. Looking through inmates' eyes, society is the one who is being punished in the long run far more than society could ever punish an inmate. Government expenditure on operating and development expenditure of security services in Malaysia increased steadily from 2014 to 2015 from 11% to 11.7% of the overall expenditure in that particular year. The operating expenditure on emoluments itself increased steadily from 2014 to 2016 where 30.5%, 32.3% and 32.7% of the total operating expenditure was allocated to emoluments alone in 2014, 2015 and 2016 respectively. Factors contributing to the increase includes an allocation of RM633 million to accommodate the improved scheme of service for the policing system in Malaysia. Operating expenditure includes foods, prisons, electricity and water bills, clothes and security for imprisonment of inmates.

Development expenditure on the other hand increases by 11.7% for security in 2011 under the National Key Results Areas (NKRAs) of combating crime in Malaysia. Since inmates are not a productive workforce of a country, expenditures on them is merely a loss of money for both the country and its society. Goh (2006) shows that the total crime costs in Malaysia is over RM12 billion, whilst the total bill add up to RM15 billion in 2004 alone. This is by far the most comprehensive crime costs estimated but still far from the real value since many costs are inaccessible especially from agencies in criminal justice system and non-government organizations (NGOs). Ishak (2016) found that each victim has to pay at least RM10,000 per crime incidence for both violent and property crime cases. In the Institute for Economic and Peace (2017) reports, Malaysia's economic impact of violence in 2016 amounted to RM154 billion and made up 4.4% of the total gross domestic product (GDP) of the country.

Another issue along the line is the fact that prisons are becoming less correctional but more motivating for recidivism. Prisons in Malaysia are seriously overcrowded. As at 2012, Malaysia's prisons are overcrowded when too many inmates are kept in prison with limited capacity. A Country Reports on Human Rights Practices (2012) on Malaysia revealed that the number of inmates in the 29 prisons designed to hold 32,000 prisoners was incorporating hold 38,751 prisoners and forced the Prison Department to come up with an international prisoner transfer program and early release of detainees to ease prison congestion issues. Overcrowding of prisons has a negative effect on the living conditions of prisoners, human detention and treatment, and pose more disciplinary problems with higher security risks. These, in turn cause prisons to be more motivating for recidivism than correctional facilities. Inmates' can learn skills to ensure that they can flee from crime, learn to adapt to prisons environment and become skilled in their crimes from trainings from peer in prisons.

With the motivation in place, this paper analyse the deterrence effect of current punishment in the state of Sarawak and suggest a more effective punishment strategy that is both profitable for the economy that could deter crime and recidivism. At the same time, we incorporate macroeconomic variables to determine the relationship between crime and the economic motivation to it. This paper contributes to the literature since firstly, it is the first study on Sarawak and utilized actual apprehension, conviction and punishment data. Secondly, it serves to provide new and more refined evidence on the crime-deterrence relationship using state level data for Malaysia. Thirdly, this paper extends the use regression analysis in economics of crime model to identify deterrence effects (Corman & Mocan 2000; Lofstrom & Raphael 2016; Tiratelli et al. 2018).

Sarawak is a state of Malaysia in northwest Borneo Island. As of the 2015 census, the population of Sarawak was 2,636,000. It is one of the most attractive tourist spot in Malaysia with 2,165,694 tourist arrivals was recorded in 2016 (Immigration Department of Sarawak 2016). Despite the large population number, Sarawak showed lower index crime compared to states like Kuala Lumpur, Selangor, Pulau Pinang and Johor (Sidhu 2005). However, it is still an important issue to identify the deterrence effect and motivation factors to crime in Sarawak especially in light of increasing crime rate. Sarawak's basic economic foundations are strong and well managed with steady growth from 2005 through 2008 at between 5.0% and 5.8%, slowing in 2009. Interestingly, in 2009 also Sarawak receives the largest share of FDI of all 13 Malaysian States. An increasing

number of foreign investors registering an interest and renewable energy are expected to be a catalyst for future growth. Crime registered an increase in the overall crime index for Sarawak by 8.23 per cent in the first four months of 2017 versus the same period of 2016. However, the indices for violent crime and unarmed gang robbery were reduced by 7.27 per cent and 17.14 per cent respectively. The number of motorcycle thefts has increased by 49.34 per cent in the period mentioned. The index for motor-van and lorry thefts was reduced by 44.44 per cent while the index for motorcar thefts also dropped by 7.35 per cent (Royal Malaysia Police 2018).

This study focuses on the deterrence effect of Sarawak state alone for several reasons. Using state level data provides more detail given the localized nature of the crime data and following Levitt (2001) suggestion that focusing on the specific predictions about a range of possible behavioural conducts through which crime operates is more important rather than merely focusing on the general linkages between them. Interestingly, many literatures found consistent results with each other in the studies that focus on state level data, counties, metropolitan areas or cities in the United States (see for example, Lee 1993; Levitt 1996, 1997; Raphael & Winter-Ebmer 2001; Gould et. al. 1998; Machin & Meghir 2000). The consistency of these results seems promising compared to national time series data which are much more sensitive to the estimation.

LITERATURE REVIEW

Delinquency, since the formation of human being, has been the choice to accomplish one's needs. Hence, law and enforcement were created in order to control the choice made by human and at the same time to provide protection to the public. In a nutshell, delinquency is a choice and can be controlled by law and enforcement. This is the foundation of the notion of economics of crime that became a distinct branch of criminology studies as compared to other theories of crime which tautologically assume criminals as abnormal human beings.

The enlightenment epoch provides first insight to economics of crime through the arguments that people have free will to choose how to act and their action depends on two sovereign masters namely, pleasure and pain (Beccaria [1995] 1764). This 18th century classical school of thought was developed when state decided to use imprisonment as a form of punishment. At the same time, many legal reforms took place including the development of the legal system in the United States and French Revolution. Bentham (1789), Beccaria (1764), and other classical school philosophers of that time proposed the theory that criminals - like normal human beings - act rationally. Criminal act is merely, and expression of fundamental human wants that ought to be fulfilled. They also suggest that punishment – instead of rehabilitation – deter crime when it is carried out proportionately to the crime. The classical school contributes to the criminology sphere a new perspective of rational choice theory indicating that criminals and non-criminals alike, reflects on costs and benefits of the corollaries from their actions. The classical school was then replaced by the positivism which suggests that government regulation or failure in society has nothing to do with criminal acts and these ideas were soon embraced by the states and society because it is in favor of them.

It is not until 1970's that the classical school ideas of rational choice theory were reviewed from an economic standpoint. Pioneered by Becker (1968), Stigler (1970) and Ehrlich (1973), the assumption that criminals are rational, and they choose to engage in criminal activities due to economic motivation became interesting and highly debated issues in economics and crime fields alike. The foundation of economics of crime analysis was built upon the cost-benefit analysis and rational choice theory of economics. The study was than extended from research on theoretical formulation to application using real data to find economic determinants and deterrence effect of punishment in a society. Research in economics of crime soon become abundance, ranging from different types of data utilized, choice of countries analyzed, variables employed and arguments on methodological choices shed lights on the discipline hence, encouraged more comprehensive and efficient law and enforcement strategies to be formulated simultaneously.

Although the economics of crime literature could be traced back from Becker (1968), it is a relatively new field in Malaysian context and was only explored in Meera (1993). The analysis of economics of crime started in 1995 and limited to the understanding of macroeconomic variables as motivation to crime (see, for example, Habibullah & Baharom 2009; Baharom & Habibullah 2009; Hamzah & Lau 2011; Habibullah et al. 2014a, 2014b; Meera & Jayakumar 1995; Tang 2009; Tang 2011). In Habibullah et al. (2016), they made a fresh attempt in analysing the relationship between good governance and crime rates in Malaysia. The study reveals that, while good governance has a negative relationship with property crime, it is not a significant variable that can help to reduce violent crime in Malaysia. The distinction, according to them, is the importance of implementing targeted policies and invest in appropriate tools to fight crime. Here, our paper will add on deterrence effect of punishment to the existing economics of crime literature on Malaysia.

RESEARCH METHOD

THE MODEL

Becker's (1968) seminal paper introduced the supply of offences model assuming criminals rationally utilize

cost-benefit analysis before deciding to engage in illegitimate activities. Although crime was extensively discussed in sociology, psychology, medical, behavioural studies, Becker (1968) pointed out that, "*Practically, all the diverse theories agree, however, that when other variables are held constant, an increase in a person's probability of conviction or punishment if convicted will generally decrease, perhaps substantially, perhaps negligibly, the number of offenses he commits*" in support of the economics of crime model. Increase in availability of more legal jobs, punishment meted out, increase in education or shift of the government policies would decrease crime at least in the short run.

He proposed individual's expected utility, $E[U]$ from an illegitimate activity to be:

$$E[U_j] = p_j U_j(Y_j - f_j) + (1 - p_j)U_j(Y_j) \quad (1)$$

where is the individual's von Neumann-Morgenstern utility function, is the subjective probability of being caught and convicted, is the monetary plus psychic income or monetary equivalent from an offence and the monetary equivalent of the punishment.

The proposed model in Becker (1968) was improved by Ehrlich (1973) with the support of empirical estimates of the revised model. Firstly, the improved model assumes that criminals have the choice between costs and gains from both legitimate and illegitimate industries as supported in the empirical evidence part of the study. Secondly, the model narrates the theory of participation in illegitimate activities using the occupational choice theory. This helps economist to predict the direction and relative magnitude of the response of offender when there is a change in the observable opportunities. Lastly, the improved model allows for differentiation between deterrent and prevention effects of punishment. This is so to allow for empirical investigation to focus on either deterrent or prevention effects individually. The supply of offences equation by Ehrlich (1973) after the modification of separating quantifiable and non-quantifiable behavioural function can be written as follows:

$$\left(\frac{Q}{N}\right)_i = p_i^{b1i} F_i^{b2i} Y_i^{c1i} Y_l^{c2i} U_i^{d_i} V_i^{c_i} Z_i \quad (2)$$

where represent the crime rates for a given category, p_i, F_i, Y_i, and Y_l are the arithmetic means of the monetary components of costs of punishment, income from illegitimate activities and income from legitimate activities; V is a vector of environmental variables and Z summarizes the effect of psychic and other non-quantifiable variables on the crime rate. Assuming that individual's taste for crime was either proportional to some of the quantifiable variables affecting crime, or uncorrelated in the natural logarithms with all the explanatory variable, Ehrlich (1973) specify a stochastic function of the supply of offences function as follows:

$$\left(\frac{Q}{N}\right)_i = AP_i^{b1i} F_i^{b2i} Y_i^{c1i} Y_l^{c2i} U_i^{d_i} V_i^{e_i} \exp(\mu) \quad (3)$$

where, A is a constant and μ stands for random errors of measurement and other stochastic effects and is assumed to have a normal distribution. The study of Ehrlich (1973) goes on until Ehrlich (1996) where he explained the basic misconception on the positive and negative incentives faced by potential criminals in their decision making process. It is believed that deterrence hypothesis only applied to negative incentives while positive incentives are useful in determining crime level and reducing it where possible. These understanding of positive and negative incentives are wrong since Ehrlich (1996) spelled out that, "*The deterrence hypothesis and its logical extension - the market model - rely on the marginal efficacy of both positive and negative incentives and on the interaction between market demand and supply forces, to explain the observed variability in the frequency of offenses across space and time*".

Persson and Siven (2007) proposed an improved equilibrium model of crime by incorporating conviction technology into the picture. Their focus was allowing the model to assume the probability of innocent people being convicted. However, we do not incorporate that model since there is no reliable data available for the study of conviction of innocent people in Sarawak. It is also less significant in understanding the deterrent effect of punishment. The crime-supply equation as extracted from the economic crime model as developed by Ehrlich (1973; 1996) could be written as:

$$C = f(GDP, UER, REG, CONV, IMP) \quad (4)$$

where C refers to the crime rate; GDP is the gross domestic product that represents the legitimate income level, UER is the unemployment rate which is the proxy for relative gains from illegitimate activities (Raphael & Winter-Ebmer, 2001; Chapman et al. 2002; Mustard 2010; Wu & Wu 2012) REG is number of cases registered in high court, CONV is conviction rate and IMP is imprisonment. The last three variables are the proxy to analyse the level of deterrence effect of punishment.

The model explained that number of cases registered in high court, conviction rate and imprisonment are endogenous variables and act as proxy to analyse the deterrent effect of punishment both in general term and as crime specific. Crime rates are a function of both the macroeconomic variables and the deterrence variables. The prediction following this model is that the deterrence variables should decrease crime incidence and the macroeconomic variables should increase crime incidence.

THE DATA

There will be six variables used in this paper to analyse the economic motivations and deterrence analysis of

crime spanning from 1960 to 2012. Crime variables in Malaysia are a highly confidential data and require enormous paperwork for the data to be obtained from official police departments. The publications of any data used from the police officials also require written approval to be used in any publications to the general public. Crime data also depend on the investigations involved, after a report is lodged, identifying the validity of the reports, investigations, and convictions of criminals as valid crime index which involves longer time period before the exact data can be published. This is an ongoing debate in the criminology field and a study found that 15% of articles published used data that were over a decade old (Nelson et. al. 2013). Furthermore, no significant shift in the law enforcement was recorded in Malaysia or Sarawak after the time period analysed. There is also no significant crisis or macroeconomic shocks that could provide any important differences in the data analysed after 2012. Gross domestic products and unemployment rate were obtained from Statistics Department of Malaysia online time-series data publications for Sarawak. Crime variables used are disaggregated into seven different crime categories namely murder, rape, crime against person, robbery, housebreaking, theft, crime against property and total crime. The crime variables were obtained with special permission from the Royal Malaysia Police Department (PDRM) and expressed as the annual incidence per 10,000 populations. The deterrence variables are extracted from various issues of Sarawak Annual Economic Bulletin. The deterrence variables chosen were based on the availability of data was also based on Luiz (2001). All variables were transformed into log-linear form to determine the elasticity of the estimated coefficients (Cherry 1999) except for the unemployment rate. Table 1 list out all the variables used in this paper and its abbreviation.

TABLE 1. List of abbreviation

Variables	Abbreviation
Disaggregated crime variables	
Murder	Mdr
Rape	Rpe
Robbery	Rby
Housebreaking	Hbg
Theft	Tft
Crime Against Person	Apn
Crime Against Property	Apy
Total Crime	Ttl
Explanatory Variables	
Gross Domestic Product	GDP
Unemployment Rate	Uer
Imprisonment Rate	Imp
Number of Cases Registered in High Court	Reg
Conviction Rate	Conv

THE ESTIMATION

Following Becker (1968) and its extension in Ehrlich (1973, 1996), the empirical counterpart of equation 1 is stated below:

$$C_t = \alpha + \beta_1 GDP_t + \beta_2 UER_t + \beta_3 REG_t + \beta_4 CONV_t + \beta_5 IMP_t + \mu_t \quad (5)$$

where C_t refers to the crime rate; GDP_t is gross domestic products that represents the legitimate income level; UER_t is the unemployment rate which is the proxy for relative gains from illegitimate activities and time to allocate into illegitimate activities; REG_t is the number of cases registered in high court, $CONV_t$ is the conviction rate, and IMP_t is the imprisonment rate as proxy to estimates the efficiency of law enforcement strategies. Hypothetically, economic theory of crime would expect GDP, number of cases registered in high court, conviction rate, and imprisonment rate should be negatively related to crime. All deterrence variables should, at least, in the short-run, decrease crime rate when criminals are going through the process of law. GDP on the other hand will decrease crime since higher income will creates more jobs, improve standard of living, and increase education opportunities hence decreasing crime rate. Unemployment rate are expected to be positively related to crime. Higher unemployment rate is a motivation to engage in criminal activities since there is no legal means for criminals to survive (Becker 1968). Somewhere in the literature, studies also found a positive relationship between crime and unemployment. Cantor and Land (1985) explained that the positive relationship is attributed to the increase in security for property when people are unemployed and stay at home.

Standard econometric analysis will be applied in this study ranging from stationarity test, cointegration analysis, vector error correction model (VECM) and post-sample variance decompositions (VDC) analysis. Cointegration technique explains the long-run relationship between two or more variables. Two or more variables are said to be cointegrated when they share a common trend, and this imply that variables in the system exhibit a long-run relationship among them. This study employs cointegration analysis developed by Johansen and Juselius (1990) to determine the long-run relationship properties of the crime model. The Johansen process is a maximum likelihood method that determines the number of cointegrating vectors in a non-stationary time series Vector Autoregression (VAR) with restrictions imposed, known as a vector error correction model (VECM). Johansen and Juselius (1990, JJ) defines two different test statistics for cointegration under his method, the Trace Test and the Maximum Eigenvalue Test. The

Trace test is a joint test that tests the null hypothesis of no cointegration (H_0: $r = 0$) against the alternative hypothesis of cointegration (H_1: $r > 0$). The Maximum Eigenvalue test conducts tests on each eigenvalue separately. It tests the null hypothesis that the number of cointegrating vectors is equal to r against the alternative of r+1 cointegrating vectors (Brooks 2008).

After cointegration, this paper exploits the idea that there might be an existence of co-movements between crime and related explanatory variables and possibilities that they will trend together in finding a long-run stable equilibrium by the Granger representation theorem. Assuming the dynamic behaviour of the crime variables and related independent variables cointegrated of order r, the imposition of the constraints can be conducted to the vector autoregressive (VAR) model to enable a VECM formulation expressed as:

$$\Delta C_t = \delta_0 + \sum_{i=1}^{m}\alpha_1 \Delta \mathrm{GDP}_{t-i} + \sum_{i=1}^{n}\alpha_2 \Delta \mathrm{UER}_{t-i} + \sum_{i=1}^{o}\alpha_3 \Delta \mathrm{REG}_{t-i} + \sum_{i=1}^{p}\alpha_4 \Delta \mathrm{CONV}_{t-i} + \sum_{i=1}^{q}\alpha_5 \Delta \mathrm{IMP}_{t-i} + \mu_1 \mathrm{ECT}_{t-1} + \varepsilon_t \quad (6)$$

Where C_t is an $n \times 1$ vector of crime categories, δ and α's are estimable parameters, Δ is a difference operator, ε_t is a vector of impulses which represent the unanticipated movements in crime rates and μ_1 ECT_{t-1} contains the r individuals error-correction terms derived from the r long-run cointegrating vectors via the Johansen maximum likelihood procedures. Engle and Granger (1987) illustrated that once a number of variables are found to be cointegrated, there always exists a corresponding error correction representation which suggests that changes in the dependent variable are a function of the level of disequilibrium in the cointegrating relationship as captured by the error correction term (ECT) and changes in other explanatory variables. Through the ECT, a new channel of Granger causality could be analysed which is not available in the standard Granger causality test (Engle & Granger 1987).

All the estimation procedures explained earlier can be inferred as within-sample estimations which only carter for the variables relationship within the sample period analysed. This weakness can be fixed using variance decompositions (VDCs) analysis which may be termed as out-of-sample causality tests. VDCs partitioned the variance of the forecast error of certain variables (crime categories for this study) into proportions attributable to shocks in each variable in the system including its own, provides an indication of these relatives. According to Sims (1982), variables that are optimally forecast from its own lagged values will have all its forecast error variance accounted for by its own disturbances. The benefit of VDCs compared to previous analysis is that it can help to gauge the amount of information all variables in the model contributes to each other in the system. The effect of any shocks into the system are measured by the value up to 100 per cent. A variable that is optimally forecast from its own lagged values will have all its forecast error variance accounted for by its own disturbances (Sims 1982).

EMPIRICAL RESULTS

The model estimated for this study consists of six variables: different types of crime rates (C), GDP, unemployment (UER), number of cases registered in high court (REG), conviction rates (CONV) and imprisonment rates (IMP). A wide range of unit root tests was applied preceding the Johansen and Juselius (1990, JJ) multivariate cointegration tests to identify the number of times a variable need to be differenced in order to turn it to stationarity. Tests indicated that all variables were non-stationary at the `level' form but stationary after `first differencing'. It can be concluded that all the variables in the system estimated were $I(1)$[1] except for conviction rate which is found to be integrated of order 0 or $I(0)$. Findings are consistent with Greenberg (2001) and Narayan et. al. (2010) who found $I(1)$ to support the evidence of a natural rate of crime.

The natural rate of crime hypothesis provides two equitable conclusions in the progress of analysing the relationship between crimes and its determinants. Firstly, if stationary properties were found in the crime rate, it is inevitable that although deterrence activities of the police force can cause deviations from the natural rate of crime, it is only transitory, and the crime rate will return to its equilibrium level in the long run. Secondly, suppose that the tests are unable to reject the null hypothesis of a unit root in crime data, the crime hysteresis hypothesis which states that cyclical fluctuations have permanent effects on crime rates will be considered valid. This in turn supports the argument to increase government expenditure on police activities will reduce crime in the short-run. From the analysis, all crime categories in Sarawak established a natural rate of crime and proved that deterrence effect will only be transitory, but conviction rate could deter crime in the short run.

The second part of the analysis focus on analysing the long-run relationship between crime and the explanatory variables incorporated in the model. Although our univariate unit root tests provide mixture of order of integration among the variables, we proceed with the JJ cointegration test. As indicated in Harris and Sollis (2003 pp 114) the JJ test are designed to handle $I(1)$ and $I(0)$ variables while if $I(2)$ variables exists, we must either replace then with an $I(1)$ alternatives through some form of differencing or it will be necessary to use the approach developed by Johansen (1995) for $I(2)$ model. Similar view was echoed in Asteriou and Hall (2016, pp 383) on the suitability for the adoption of Johansen and Juseliues (1990) approach even one have $I(0)$ and $I(1)$ variables in the estimation model.

Table 2 outline the analysis results for Johansen cointegration tests. All disaggregated crime models

TABLE 2. Cointegration Test Results

Property Crime									
Null	Alternative	rby		Hbg		tft		apy	
		$k = 1, r = 1$		$k = 1, r = 1$		$k = 3, r = 1$		$k = 2, r = 1$	
		λmax	Trace	λmax	Trace	λmax	Trace	λmax	Trace
$r = 0$	$r = 1$	48.66	111.04	44.95	96.67	45.27	101.74	45.24	101.48
		(0.00)*	(0.00)*	(0.01)*	(0.04)*	(0.01)*	(0.02)*	(0.01)*	(0.02)*
$r \leq 1$	$r = 2$	29.10	62.38	24.17	51.72	26.33	56.48	28.52	56.24
		(0.17)	(0.17)	(0.44)	(0.56)	(0.30)	(0.36)	(0.19)	(0.37)
$r \leq 2$	$r = 3$	16.38	33.28	14.22	27.55	16.73	30.15	16.84	27.72
		(0.63)	(0.54)	(0.81)	(0.83)	(0.60)	(0.71)	(0.59)	(0.83)
$r \leq 3$	$r = 4$	12.87	16.90	9.20	13.34	8.92	13.42	6.86	10.89
		(0.46)	(0.65)	(0.81)	(0.88)	(0.84)	(0.87)	(0.96)	(0.96)
$r \leq 4$	$r = 5$	3.78	4.03	4.12	4.13	3.85	4.50	4.02	4.03
		(0.88)	(0.90)	(0.85)	(0.89)	(0.87)	(0.86)	(0.86)	(0.90)
$r \leq 5$	$r = 6$	.24	.24	0.00	0.00	0.65	0.65	0.01	0.01
		(0.62)	(0.62)	(0.99)	(0.99)	(0.42)	(0.42)	(0.94)	(0.94)
Violent & Total Crime									
Null	Alternative	mdr		Rpe		apn		ttl	
		$k = 1, r = 1$		$k = 1, r = 1$		$k = 1, r = 1$		$k = 1, r = 1$	
		λmax	Trace	λmax	Trace	λmax	Trace	λmax	Trace
$r = 0$	$r = 1$	50.15	118.88	40.22	96.71	44.91	97.63	44.48	96.03
		(0.00)*	(0.00)*	(0.04)*	(0.04)*	(0.01)*	(0.00)*	(0.02)*	(0.04)*
$r \leq 1$	$r = 2$	29.45	68.73	24.14	55.49	22.84	53.43	25.98	51.55
		(0.19)	(0.18)	(0.45)	(0.36)	(0.33)	(0.16)	(0.32)	(0.57)
$r \leq 2$	$r = 3$	16.15	39.27	16.48	32.35	16.50	30.59	14.95	25.58
		(0.73)	(0.51)	(0.62)	(0.59)	(0.38)	(0.32)	(0.75)	(0.90)
$r \leq 3$	$r = 4$	13.48	23.12	12.37	15.87	9.72	14.09	6.99	10.62
		(0.51)	(0.52)	(0.51)	(0.72)	(0.52)	(0.53)	(0.95)	(0.97)
$r \leq 4$	$r = 5$	5.97	9.64	3.34	3.50	3.54	4.38	3.54	3.63
		(0.79)	(0.67)	(0.16)	(0.94)	(0.70)	(0.66)	(0.90)	(0.93)
$r \leq 5$	$r = 6$	3.68	3.68	0.16	0.16	0.84	0.84	0.08	0.08
		(0.46)	(0.46)	(0.69)	(0.69)	(0.41)	(0.41)	(0.77)	(0.77)

Notes: Asterisks (*) denote statistically significant at 5% level. *k* is the lag length and *r* is the number of cointegrating vectors(s). Figures in the parenthesis are the probabilities of rejection for Johansen tests. The test uses 95% critical values for all disaggregate crime felonies.

signify the existence of one cointegrating vectors or support the hypothesis of long run relationship among variables incorporated into the model. Habibullah and Law (2008) and Habibullah and Baharom (2009) when estimating economics of crime relationships in Malaysia also found similar result. However, they did not include the deterrence variables in their model. The number of cointegrating relationships found in Table 2 will result in a corresponding number of residual series, and hence error correction term (ECTs), to be analysed in the following error correction model (VECM). The focal aim of this study is the temporal dynamic effects of deterrence and economic factors on various types of crime. Thus, results are restricted in explaining that aspects only in particular although many other interesting insights could be gained from it. Results for temporal causality based on vector error correction model (VECM) are presented in Table 3.

Results for all disaggregated crime models show that crime rates are econometrically exogenous in the model. This is proven by the non-significance of both the *F*-test and *t*-test of the analysis. The burden of short-run adjustment which will bring back the system into its equilibrium falls under number of criminal cases registered in high court for housebreaking, theft, crime against property and total crime model. For rape and crime against person, the burden falls under GDP, murder will be reverted into short-run adjustment by unemployment rate and for robbery it is imprisonment.

TABLE 3. Granger Causality in VECM Test Result

Dependant Variables	Δcrime	ΔGDP	Δuer coef	Δreg *t*-stat	Δconv	Δimp	Parameter (normalizing)	ECT_{t-1}	
								coef	*t*-stat
Panel 1: Robbery									
Δcrime	-	1.77 (0.62)	3.68 (0.30)	1.82 (0.61)	1.70 (0.64)	3.05 (0.38)	*1.00*	0.01	0.08
ΔGDP	2.81 (0.42)	-	2.69 (0.44)	3.49 (0.32)	7.47 (0.06)**	2.32 (0.51)	*-1.76*	0.05	1.63
Δuer	1.93 (0.59)	1.28 (0.73)	-	5.61 (0.13)	1.95 (0.58)	3.23 (0.36)	*0.55*	-0.40	-1.93
Δreg	2.44 (0.49)	.25 (0.97)	0.39 (0.94)	-	6.95 (0.07)**	0.26 (0.97)	*-5.22*	0.10	1.63
Δcon	5.32 (0.15)	201 (0.57)	0.27 (0.97)	3.00 (0.39)	-	0.67 (0.88)	*2.44*	0.03	0.33
Δimp	2.94 (0.40)	4.90 (0.18)	8.84 (0.03)*	.64 (0.89)	2.79 (0.42)	-	*4.88*	-0.12*	-2.24*
Panel 2: Housebreaking									
Δcrime	-	.09 (0.76)	.46 (0.50)	0.07 (0.80)	1.23 (0.27)	0.90 (0.34)	*1.00*	-0.07	-0.79
ΔGDP	0.85 (0.36)	-	0.09 (0.76)	1.35 (0.24)	1.17 (0.28)	2.64 (0.10)	*0.29*	-0.05	-1.46
Δuer	1.20 (0.27)	2.86 (0.09)**	-	2.32 (0.13)	0.59 (0.44)	0.03 (0.87)	*0.03*	0.18	0.60
Δreg	.17 (0.68)	0.36 (0.55)	0.07 (0.79)	-	0.18 (0.67)	1.08 (0.30)	*1.78*	-0.31*	-4.43*
Δcon	2.52 (0.11)	1.01 (0.31)	1.47 (0.23)	1.06 (0.30)	-	0.07 (0.79)	*0.76*	-0.08	-0.77
Δimp	5.93 (0.01)*	0.59 (0.44)	5.83 (0.02)*	0.03 (0.87)	2.34 (0.13)	-	*-2.10*	0.22	2.70
Panel 3: Theft									
Δcrime	-	1.43 (0.49)	0.59 (0.75)	2.24 (0.33)	0.71 (0.70)	1.82 (0.40)	*1.00*	-0.04	-0.92
ΔGDP	1.66 (0.43)	-	0.66 (0.72)	1.92 (0.38)	0.00 (1.00)	1.10 (0.58)	*0.54*	0.02	0.58
Δuer	1.91 (0.39)	2.93 (0.23)	-	0.14 (0.93)	0.86 (0.65)	3.66 (0.16)	*-0.37*	0.85	2.67
Δreg	0.48 (0.79)	0.54 (0.76)	1.34 (0.51)	-	1.84 (0.40)	0.33 (0.85)	*-0.36*	-0.25*	-2.74*
Δcon	0.58 (0.75)	1.70 (0.43)	0.23 (0.89)	0.19 (0.91)	-	0.27 (0.87)	*0.86*	-0.12	-0.89
Δimp	0.32 (0.85)	1.36 (0.51)	3.09 (0.21)	0.96 (0.62)	0.84 (0.66)	-	*-2.60*	0.19	1.92
Panel 4: Crime Against Property									
Δcrime	-	3.75 (0.15)	0.16 (0.92)	2.22 (0.33)	1.49 (0.47)	0.08 (0.96)	*1.00*	-0.02	-0.38
ΔGDP	1.70 (0.43)	-	0.47 (0.79)	2.18 (0.34)	0.05 (0.97)	3.20 (0.20)	*0.43*	0.06	1.24
Δuer	3.99 (0.14)	3.67 (0.16)	-	0.21 (0.90)	1.54 (0.46)	4.36 (0.11)	*-0.31*	0.90	2.83
Δreg	1.22 (0.54)	3.23 (0.20)	2.15 (0.34)	-	3.50 (0.17)	0.21 (0.90)	*-0.15*	-0.24*	-2.69*
Δcon	3.11 (0.21)	2.18 (0.34)	0.63 (0.73)	0.81 (0.67)	-	0.49 (0.78)	*0.86*	-0.15	-1.18
Δimp	0.93 (0.63)	0.79 (0.67)	3.48 (0.18)	2.05 (0.36)	1.38 (0.50)	-	*-2.35*	0.22	2.16

Panel 5: Murder									
Δcrime	-	1.23 (0.27)	0.36 (0.55)	0.01 (0.92)	0.06 (0.81)	0.32 (0.57)	*1.00*	-0.03	-0.51
ΔGDP	0.34 (0.56)	-	1.40 (0.24)	0.24 (0.62)	0.16 (0.69)	0.67 (0.41)	*-0.78*	0.04	1.53
Δuer	2.43 (0.12)	2.37 (0.12)	-	0.01 (0.94)	0.35 (0.56)	3.09 (0.08)**	*0.41*	-0.62*	-3.13*
Δreg	0.40 (0.53)	0.11 (0.74)	0.21 (0.65)	-	0.36 (0.55)	0.04 (0.84)	*0.09*	0.15	2.48
Δcon	0.05 (0.82)	0.11 (0.74)	0.47 (0.49)	0.03 (0.86)	-	0.70 (0.40)	*-0.26*	0.03	1.13
Δimp	0.00 (0.97)	1.72 (0.19)	1.70 (0.19)	0.68 (0.41)	0.24 (0.62)	-	*2.36*	-0.10	-1.59
Panel 6: Rape									
Δcrime	-	0.82 (0.94)	3.01 (0.56)	1.92 (0.75)	1.03 (0.91)	3.65 (0.46)	*1.00*	0.00	0.04
ΔGDP	7.88 (0.10)	-	2.79 (0.59)	5.12 (0.28)	7.79 (0.10)	5.60 (0.23)	*0.35*	-0.10*	-2.66*
Δuer	2.98 (0.56)	8.47 (0.08)**	-	2.09 (0.72)	1.92 (0.75)	2.37 (0.67)	*0.29*	0.13	0.37
Δreg	16.65 (0.00)*	5.42 (0.25)	3.07 (0.55)	-	7.14 (0.13)	6.65 (0.16)	*1.89*	0.16	2.38
Δcon	3.61 (0.46)	0.21 (0.99)	.57 (0.97)	1.92 (0.75)	-	3.96 (0.41)	*-3.82*	-0.06	-0.45
Δimp	9.02 (0.06)**	4.65 (0.32)	7.89 (0.10)	2.95 (0.57)	2.62 (0.62)	-	*1.90*	0.07	0.93
Panel 7: Crime Against Person									
Δcrime	-	2.23 (0.69)	0.43 (0.98)	4.30 (0.37)	2.70 (0.61)	4.85 (0.30)	*1.00*	0.03	0.59
ΔGDP	5.80 (0.21)	-	1.87 (0.76)	1.74 (0.78)	10.10 (0.04)*	5.88 (0.21)	*7.26*	-0.06*	-3.39*
Δuer	1.46 (0.83)	6.62 (0.16)	-	5.94 (0.20)	6.83 (0.15)	3.96 (0.41)	*-0.66*	0.34	2.90
Δreg	7.77 (0.10)	1.38 (0.85)	4.04 (0.40)	-	1.11 (0.89)	5.94 (0.20)	*0.85*	0.04	0.90
Δcon	6.99 (0.14)	0.45 (0.98)	0.29 (0.99)	3.95 (0.41)	-	2.47 (0.65)	*-6.89*	-0.01	-0.22
Δimp	11.08 (0.03)*	4.79 (0.31)	3.47 (0.48)	5.84 (0.21)	4.43 (0.35)	-	*-0.02*	0.03	0.81
Panel 8: Total Crime									
Δcrime	-	4.65 (0.10)	0.03 (0.98)	1.25 (0.53)	1.02 (0.60)	0.42 (0.81)	*1.00*	-0.04	-0.91
ΔGDP	1.27 (0.53)	-	0.42 (0.81)	1.36 (0.51)	0.08 (0.96)	2.29 (0.32)	*0.60*	0.03	0.74
Δuer	2.28 (0.32)	4.31 (0.12)	-	0.08 (0.96)	1.37 (0.50)	4.21 (0.12)	*-0.34*	0.77	2.64
Δreg	1.01 (0.60)	1.71 (0.42)	2.19 (0.33)	-	3.02 (0.22)	0.25 (0.88)	*-0.03*	-0.21*	-2.59*
Δcon	3.61 (0.16)	1.31 (0.51)	0.73 (0.69)	0.86 (0.65)	-	0.49 (0.78)	*0.93*	-0.13	-1.13
Δimp	1.42 (0.49)	0.65 (0.72)	3.50 (0.17)	2.84 (0.24)	1.97 (0.37)	-	*-2.84*	0.22	2.40

Notes: The ECTs were derived by normalizing one or more cointegrating vector(s) on respective crime variables resulting in r number of residuals. Asterisks * and ** indicates significance at 5% and 10% levels respectively. Figures in parenthesis () are the probability of short-run adjustment.

The short-run adjustment into long-run equilibrium are estimated to take 3.2, 4, 4.2 and 4.8 years through number of criminal cases registered in high court for housebreaking, theft, crime against property and total crime respectively. For the case of rape and crime against person, the model will revert back to long-run equilibrium through short-term adjustment in GDP after approximately 10 years for rape and 16.7 years for crime against person. Robbery's system will revert to its long-term equilibrium on average after 8.3 years of short-term adjustment in the imprisonment rate while murder will revert into long-run equilibrium through unemployment after 1.6 years of average short-term adjustment.

Results from the Granger causality tests show that imprisonment can be caused by housebreaking, rape, and crime against person while number of cases registered in high court and imprisonment can be caused by rape. This is an important factor to be discussed in terms of costs of punishment. Housebreaking, rape and crime against person are three crime cases that can efficiently caught and convicted in Sarawak as evidence for efficient police investigation. Pictures of the granger causality relationship were presented in Figure 1. Coefficient on the lagged error correction term in the comprehensive model outlined in Table 3 shows that deterrence variables are significant implying that changes in deterrence variables are a function of disequilibrium in the cointegrating relationship for robbery, housebreaking, theft, total crime and crime against property. The error correction model suggest that once shocked, convergence to the long-run equilibrium is slow in robbery, housebreaking, theft, crime against property and total crime model. Imprisonment are found to be negatively related to Housebreaking, theft, crime against property, crime against person, and total crime while positively related to robbery, murder and rape. Although positive relations imply that every increase in imprisonment causes crime to increase but this relationship must be interpreted with cautious. It cannot be interpreted as imprisonment caused crime to increase rather it is the deterrence objectives of imprisonment were not achieved. Kuştepeli and Őnel (2006) while investigating different types of crime categories from 1967 to 2004 in Turkey also found deterrence variables to be positively associated with crime against property. Cherry and List (2002) proposed that either deterrence were less influential or people are not aware of the severity of punishment.

The short-run adjustment into long-run equilibrium are estimated to take 3.2, 4, 4.2 and 4.8 years through number of criminal cases registered in high court for housebreaking, theft, crime against property and total crime respectively. For the case of rape and crime against person, the model will revert back to long-run equilibrium through short-term adjustment in GDP after approximately 10 years for rape and 16.7 years for crime against person. Robbery's system will revert to its long-term equilibrium on average after 8.3 years of short-term adjustment in the imprisonment rate while murder will revert into long-run equilibrium through unemployment after 1.6 years of average short-term adjustment.

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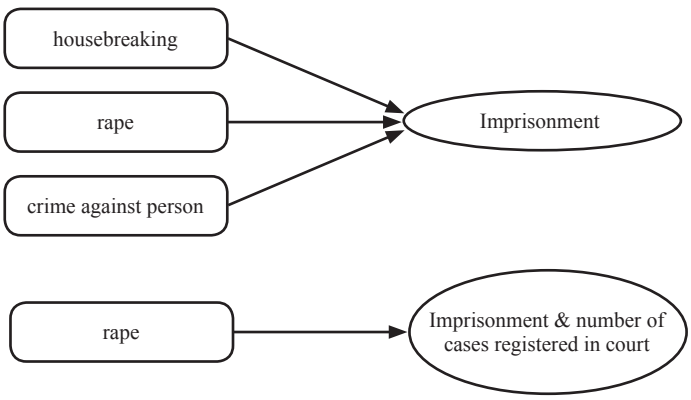

FIGURE 1. Granger Causality Relationship

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From our causality analysis results, our paper support the second arguments where new criminals are not aware of the efficiency of police investigation and lack understanding of severity of punishment. Interestingly, conviction rate are found to be negatively related to murder, rape and crime against person only while it is evident that conviction rate do not deter property crime. This contradicts with the deterrence effect of punishment where murder and rape are positively related to crime and all property crime except housebreaking are negatively related to imprisonment. One important issue here is new criminals. Although punishment can deter recidivism but it fails to deter new criminals to commit similar crime because the risk of being caught and convicted are found to be low.

The results for the last analysis of variance decompositions are provided in Table 4. The post-sample VDCs results show that after 50 years' horizon, 78% shocks in robbery and 74% shocks in rape will be explained by GDP, unemployment rate, conviction rate, number of cases registered in high court, conviction rate and imprisonment. However, housebreaking (98%), theft (81%), murder (80%), and crime against person (85%) variables will have explained itself even after the 50 years' horizon. In this case, the explanatory variables will not have immediate impact to the crime variables but the impact will accumulate over time in a longer time span. Crime against property and total crime are proved to be weakly exogenous because only 36% and 45% of the shocks in the respective model will be explained by the explanatory variables.

CONCLUSION

In the first part of the analysis, all crime variables are found to have a natural rate of crime characteristics. This means that crime will go back to its natural level in the long run and distort the deterrent effect of punishment. This might be due to increasing skills of re-offender or criminals who are extremely risk-taker and face decreasing marginal return to legal activity. This also explains the absence of causality that run from deterrence variables to crime and also the slow adjustment of the error correction variables. The sign of the coefficient provides interesting and mixed results between crime and deterrence variables. It can be concluded that, punishment is still ineffective in deterring crime in Sarawak. In the case of property crimes which are pecuniary gain related, both law enforcement and improvement in the economic and social fabrics are important to ensure sustainable decrease in crime rate in the long-run.

Number of cases registered in high court, conviction rates and imprisonment are variables that proxy for the likelihood of criminal success and simultaneously captures an institutional efficiency aspect that is important for the policy implications of the study. This paper proposes a dramatic change in punishment strategies for efficient policy formulation. First, crime control requires science and strategy. The science of data analysis such as the one presented in this paper and strategy to formulate a policy that can induce deterrent effects. Following Bentham and Bowring (1843), we proposed increasing severity of punishment to decrease crime. It is also important for policy makers to ensure that the severity of punishments is made public so criminals are well-informed on the costs of crime. Robbery, murder and rape cases in Sarawak are positively related to imprisonment but cannot deter crime in the long-run. As such, imprisonment was less influential in the long-run because people are not aware of the severity of the punishment. If punishments are pushed to an extent that are severe enough and publicized as information for everybody, it will serve as costs to criminals in weighing the costs and benefits of crime.

Secondly, from the analysis that shows long-run adjustment in crime will be brought by GDP and unemployment, it is also important to channel the strategies in combating crime to increase economic performance of the country. Reducing inequality, providing jobs and increase in economic growth is the most important function that in turn will serve as key to decrease crime. This is also consistent with early prevention argument mention in the early part of this paper where crime decrease when there are alternatives for them to work in legal setting. Although this is beneficial for property crime due to its pecuniary gain, preventing property crimes may also reduce the rate of violent crimes as suggested in Wilson and Kelling (1982) and Corman and Mocan (2005) through the "broken windows" hypothesis. The hypothesis was based on the idea that crime, when left unattended or ignored, more frequent and serious crime will start to occur in a community.

Lastly making crime and criminals pay. Rather than providing basic needs to inmates through government provided public finance, the inmates should be punished to survive and provide income to the society they damaged with criminal activities. Prisons should be a profit-giving organization to the government with free labour and at the same time providing skills for prisoners when they completed their sentence hence avoiding recidivism. Hamzah and Khoo (2011) in their book wrote that Selangor Chief Police Officer (CPO), Dato' Tun Hisan

TABLE 4. Variance Decomposition Analysis Results

Years	Percentage of forecast variance explained by innovations in:						Cumulative
	ΔCrime	ΔGDP	ΔUer	Δreg	Δcon	ΔImp	
Panel 1: Robbery							
10	58.47	17.24	1.36	8.18	3.96	10.77	100
20	36.00	41.75	0.98	6.22	2.21	12.83	100
30	27.71	51.65	0.86	5.11	1.47	13.20	100
40	24.18	55.91	0.81	4.61	1.14	13.36	100
50	22.24	58.23	0.78	4.35	0.96	13.45	100
Panel 2: Housebreaking							
10	98.34	0.25	0.16	0.08	0.19	0.96	100
20	98.19	0.30	0.11	0.07	0.17	1.16	100
30	98.14	0.32	0.10	0.06	0.16	1.22	100
40	98.12	0.33	0.09	0.06	0.15	1.25	100
50	98.11	0.33	0.08	0.06	0.15	1.27	100
Panel 3: Theft							
10	81.78	1.92	8.63	4.10	0.47	3.09	100
20	81.06	2.11	8.92	4.44	0.38	3.08	100
30	80.76	2.19	9.02	4.57	0.35	3.10	100
40	80.61	2.23	9.07	4.65	0.33	3.11	100
50	80.52	2.26	9.10	4.69	0.32	3.12	100
Panel 4: Crime Against Property							
10	73.91	11.79	0.84	8.55	1.64	3.28	100
20	67.23	15.20	0.46	11.11	1.71	4.29	100
30	65.08	16.25	0.36	11.94	1.73	4.64	100
40	64.09	16.73	0.31	12.32	1.74	4.80	100
50	63.54	17.00	0.28	12.54	1.75	4.89	100
Panel 5: Murder							
10	86.59	4.10	1.27	0.89	0.04	7.12	100
20	82.67	4.66	1.51	1.27	0.05	9.84	100
30	81.27	4.85	1.59	1.41	0.05	10.82	100
40	80.57	4.95	1.64	1.48	0.05	11.32	100
50	80.15	5.00	1.66	1.52	0.05	11.61	100
Panel 6: Rape							
10	39.04	39.06	1.02	4.14	1.14	15.60	100
20	27.65	44.81	1.50	9.88	8.19	7.97	100
30	26.45	45.55	1.47	11.14	9.76	5.63	100
40	26.03	46.81	1.44	10.77	9.91	5.05	100
50	25.66	47.67	1.41	10.50	9.99	4.76	100
Panel 7: Crime Against Person							
10	73.31	2.56	2.40	7.95	12.07	0.70	100
20	78.78	1.93	1.88	5.54	10.86	1.01	100
30	81.79	1.49	1.43	4.23	10.01	1.06	100
40	83.57	1.20	1.15	3.45	9.57	1.06	100
50	84.77	1.01	0.96	2.96	9.26	1.06	100
Panel 8: Total Crime							
10	67.71	14.82	0.96	8.79	1.47	6.25	100
20	59.82	18.30	0.61	11.72	1.62	7.93	100
30	57.31	19.39	0.51	12.66	1.66	8.48	100
40	56.14	19.89	0.46	13.11	1.68	8.73	100
50	55.47	20.18	0.43	13.36	1.69	8.88	100

Notes: This test utilized Choleski decomposition in order to orthogonalize the innovations across equations. All figures are estimates rounded to two decimal places – rounding errors may prevent perfect percentage decomposition in some cases.

said, "*It is essential to become adept to listening so as to integrate new knowledge into our programmes, or new breaks and circumstantial changes to be received and integrated for dramatic changes*".

Moving forward, more research should be conducted using all states in Malaysia to ensure correct policies could be implemented depending on the crime behaviour of particular states in future. One of the important perspective to be focused on is the criminal perspective on crime motivation and costs. This could further strengthen the findings from secondary data compiled from numerous resources. It is also important to have a panel approach of cross-states analysis of crime variables for a more comprehensive perspective on crime pattern in Malaysia.

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NOTES

[1] Results are not presented in this paper due to space limitations but are available upon request from the author.

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