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Determinants of Malaysia's Expenditure on Security and Its Impact Towards Economic Growth

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Abstract
This paper aims to better understand the relationship between security expenses and their impact on economic growth for Malaysia. Using time-series data from 1971 to 2020, this study adopts the AK and Barro's (1990) Model as the basis of the empirical model and employs ARDL estimation regression. The results suggest significant short-run and long-run relationships between security expenditure and economic growth in Malaysia. We recommend that the Malaysian government improve its method of allocating national expenses by appointing an independent group of experts in economics and security to incorporate technology when devising the budget for security.

Keywords: Determinants; Expenditure; Security; Economic Growth

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1.0 Introduction

The economic performance of nations throughout the world was significantly affected when the COVID19 epidemic struck in 2020. In addition, the government had to allocate more funds to the national health system, as well as give incentives and help to those who were economically affected. According to a McKinsey poll on public sector transformation in 2017, 42 percent of 2,909 respondents stated that cost reduction or optimization is frequently a top priority for public sector transformation projects. It is plausible to assume that eliminating or significantly reducing the deficit will need greater revenues, entitlement changes to minimize mandated expenditure, and cuts to defense and other federal spending wherever practicable (Matthews, 2013). While local government reforms in the twentieth century were primarily concerned with the benefits of competition, twenty-first-century reforms are more concerned with the need for making strategic decisions and the benefits of cooperation – among local governments, the public and private sectors, and workforce, citizens, and government interests (Germa Bel et. al.,2018). The Malaysian government, through the Ministry of National Finance, proposed the 2022 budget in October 2021, with the theme "*Keluarga Malaysia, Makmur Sejahtera*". According to the announcement, the 2022 budget would be the biggest in Malaysian history, with a budget allocation of RM 332.1 billion, an increase of RM 3.61 billion over the previous year. The national security sector is given 10% of the budget, which includes development and management components. However, a review of Malaysia's crime data over the last decade reveals that the country's crime rate has been on the decline, while spending on national security under the Ministry of Home Affairs and the Ministry of Defence has continued to rise. Why would the Malaysian Government keep allocating a high sum of budget in the public safety sector while statistics show a huge improvement in crime index for the past ten years?

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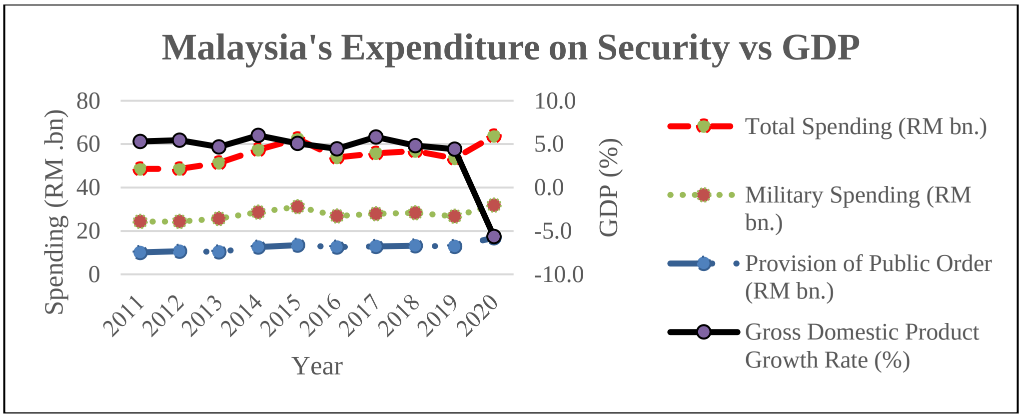

Figure 1: Malaysia's Expenditure on Security versus GDP in Malaysia for period 2011 – 2020

2.0 Literature Review

2.1 Economic Growth

Many academic researchers have been rigorously seeking the connections between a country's fiscal expenditure and its influence on economic growth in recent years. Numerous works have been undertaken in this field (*inter alia* Gheraia et al., 2021; Tharshan et al., 2021; Elfaki et al.,2021; Jeff-Anyeneh and Ibenta,2019; Sasana & Kusuma, 2018; Djohan et al.,2016; Maingi et al.,2013; Ebiringa et al.,2012) by focusing on common economic indicators such as GDP, employment rate, industrial production index, consumer spending or household income, inflation rate, population, education and healthcare, each indicator is translated into variables and represented by mathematical formula hence, extracting the relationship between these indicators towards economic growth. According to the study's findings, economic growth in Indonesia has a favourable impact on poverty reduction. As the government spending increase, per capita income and labour force participation increase whilst and poverty decline in Indonesia (Sasana & Kusuma, 2018).

2.2 Security in Nation

Numerous studies in many nations throughout the world have focused on police service efficiency for example Kenya (Nassiuma et al., 2021); Malaysia (Selvanathan et al., 2017); Canada (Taylor Griffiths et al., 2014); Spain (García-Sanchez, 2009); Portugal (Barros, 2007); United States of America (Gorman & Ruggiero, 2008); Turkey (Akdogan, 2012), among others. Apart from studies related to the efficiency of the police department, from time immemorial, there are many researchers who make studies related to the impact of military expenses on economic growth such as studies made related to military expenses nexus in Jordan (Dimitraki, O. & Win, S., 2021), military expenditures in the maelstrom of the globalized world (Krtalić & Major, 2010), military economy and economic growth; bidirectional effects in transition economies of Eurasia (Rudy. K, 2022) and military spending and fiscal sustainability indicator for Malaysia (Wan Suleiman et. al, 2018). Data on military expenditure is widely available and reliable, hence, most studies on security use military expenditure as a proxy for security spending. However, we find that the results of similar studies on the impact of security expenses on GDP are not unanimous.

2.3 Determinants of Growth

We use the following proxies namely initial GDP, Malaysia population, government investment, security expenses, military expenses, domestic credit and inflation rate as our variables in this study. In terms of police public service, Beck and Goldstein (2017) and Radulovi'c and Dragutinovi'c (2015) discovered that larger percentages of youth (between 15 and 29 years) and senior (over 65 years) populations led to greater inefficiencies in service delivery. Revelli (2009) proved that larger percentages of white population translated into better local government performance. The population's economic status, as reflected by household disposable income, has also been considered as an explanatory variable for the effectiveness of municipal police services, however with mixed findings (Benito, Bastida, & Garca, 2010). In this regard, P'erez-Lopez' et al. (2015) stated that understanding the most efficient style of management in the provision of public services is critical in ensuring financial sustainability. Government expenditure is the amount of money allocated by the public sector for the purchase of products and the delivery of services, such as defense, social protection, healthcare, and education (CFI Team, 2022). The country's investment can also be seen to play a role in determining the country's GDP performance. For example, Mexico's public sector debt has maintained at a low level, for example, at 45.5 percent of GDP in 2019 while public investments have not increased (Sánchez et al., 2022). By extending the tax base to encompass the external benefits produced by private investment, the government can increase the breadth of the economic advantages of a balanced-budget fiscal stimulus (Dosi et al., 2021). A shock in government spending results in a drop in inflation and consumption but the shock in government spending must be sufficiently persistent to lead to an increase in inflation and consumption (Jørgensen & Ravn, 2022).

3.0 Methodology

This study utilized yearly time-series data from 1971 to 2020. The wide range and complete data is adequate and reliable for this study with respect to the objective of the study. Bigger time frame data may provide enough information in terms of data reliability, data consistency and providing precise patterns in model estimation (Lie et al., 2019). Time series data such as annual data, have an ability to capture the actual situation for the whole year (Rambeli et al., 2021). The background on the data for each variable in the empirical model is provided in the next section. Table 1 summarized the acronym, description and source of the data used in this paper. With reference to Table 1, data for I_GDP2 is sourced from the Penn World Table; GFCF, population, MILEX, DOM_CR and INF_RATE data are derived from the World Bank Development Indicator. SECEX data obtained from Ministry of Finance, Malaysia.

Table 1. The variables

Acronym	Description	Type of Variable(s)
I_GDP2	The initial level in growth regressions requiring relative living standards as initial GDP	(A) Dependent
GFCF	The Gross Fixed Capital Formation as percentage of GDP as a proxy for capital	(K) Independent
LOG_POP	Population as a proxy for labour (translated into log function).	(L) Independent
MILEX	Military expenses in as percentage of GDP as defense expenses	Control
SECEX	Security expenses in as percentage of GDP as non-defense expenses	Control
DOM_CR	Domestic credit to private sector by banks	Control
INF_RATE	Inflation, consumer prices at annual %	Control

3.1 Theoretical Model

One of the earliest AK models with maximizing utility was introduced by Romer (1986). Romer hypothesised a factor of production with the same public goods as previously considered and concentrated on the case where labour supply per firm was equal to 1 and the rate of capital amortization was zero (δ = 0). The owner of the representative one-worker firm, whose dynamic optimization problem is to be solved, determines savings by:

$$max \int_0^{\infty} u(c_t)e^{-\rho t}dt \quad ; \quad subject\ to\ \acute{k} = \bar{A}k^{\alpha} - c \tag{1}$$

where $\acute{k}$ is the capital stock of the individual firm, y = Ākα is its output, c = ct is the current consumption of its owner-worker, and Ā is the aggregate productivity that is taken as given by each individual firm.

Aggregate productivity is dependable with the aggregate capital stock. This can be expressed as:

$$\bar{A} = A_0 K^{\eta} \tag{2}$$

where η is a positive exponent dan reflects the extent of the knowledge externalities generated among firms.
And, K denotes as:

$$K = \sum_1^N k_j \tag{3}$$

Assuming a constant intertemporal elasticity of substitution obtained from Euler's condition, the marginal product of capital,

$$F_1(k, A) - \delta = \alpha\bar{A}k^{\alpha-1} - 0 = \alpha\bar{A}k^{\alpha-1} \tag{4}$$

The constant intertemporal elasticity of substitution is:

$$u(c) = \frac{c^{1-\varepsilon} - 1}{1-\varepsilon} \tag{5}$$

Hence,

$$-\frac{\varepsilon\dot{c}}{c} = \rho - \alpha\bar{A}k^{\alpha-1} \tag{6}$$

Individuals with rational expectations correctly anticipate that all firms will use the same capital in equilibrium, so

$$K = Nk \tag{7}$$

And therefore, the Euler condition can be written as

$$-\frac{\varepsilon\dot{c}}{c} = \rho - \alpha A_0 N^{\eta} K^{\alpha+\eta-1} \tag{8}$$

where ρ is the discount rate.

In the long run growth, the aggregate output Y is

$$Y = AK^{\alpha+\eta} \quad (9)$$

The endogenous growth model of Barro (1990) depicts that fiscal policy can influence both the level of the output path and the rate of steady-state growth. As the production function, y:

$$y = Ak^{1-\alpha}g^{\alpha} \quad (10)$$

where, *k* represents private capital and *g* is a publicly provided input. The government budget constraint relies on:

$$ng + C = M + \tau ny \quad (11)$$

where, *C* is the government-provided consumption goods, M is the lump-sum taxes and τ represents a proportional tax on output rate.

In the long-run growth rate, Barro's (1990) model (∅) can be expressed as:

$$\emptyset = \lambda(1-\tau)(1-\alpha)A^{1/(1-\alpha)}(g/y)^{\alpha/(1-\alpha)} - \mu \quad (12)$$

where, ƛ and μ are constants that refer to the parameters in the utility function. Equation 12 indicate the growth rate is decreasing in the rate of proportional taxes, increasing in government productive expenditure but remains unaffected by the lump-sum taxes or the government provided consumption goods.

3.2 Empirical Model

By employing AK Model and adhere to Barro-style model as stated in previous section the estimation regression equations can be expressed as equation 13 and 14. In all of the models in this section, i represent cross-sectional units and t represents time (year).

$$GDP_{it} = \beta_0 + \beta_1 I\_GDP2_{it} + \beta_2 GFCF_{it} + \beta_3 LOG\_POP_{it} + \beta_4 MILEX_{it} + \beta_5 SECEX_{it} + \beta_6 DOM\_CR_{it} + \varepsilon_{it} \quad (13)$$

$$GDP_{it} = \beta_0 + \beta_1 I\_GDP2_{it} + \beta_2 GFCF_{it} + \beta_3 LOG\_POP_{it} + \beta_4 MILEX_{it} + \beta_5 SECEX_{it} + \beta_6 INF\_RATE_{it} + \varepsilon_{it} \quad (14)$$

where;

β_0 is the constant, β is the coefficient and ε is the error term.

3.3 Empirical Analysis

This paper uses a few econometrics procedures. First, the augmented Dickey-Fuller (ADF) is used to test for unit root as an initial step (Dickey-Fuller, 1979). Then, the Autoregressive Distributed Lag (ARDL) and ARDL Long Run Form and Bound Test were used to confirm the presence of cointegration. The third step is to run diagnostics and stability tests by employing the Breusch-Godfrey Serial Correlation Lagrange Multiplier (LM) Test and Breusch-Pagan-Godfrey Test for heteroscedasticity. The final procedure is performing the stability diagnostic tests using cumulative sum (CUSUM) and CUSUM of squares (CUSUMSQ) stability tests and Ramsey-Regression Equation Specification Error Test (RESET) functional form test.

4.0 Findings

The descriptive statistics of the variables used in the estimate of the models discussed in the previous section is shown in Table 2. The mean, minimum value, and maximum value, minimum value, standard deviation, and observations are all shown in Table 2.

Table 2. Descriptive analysis for the variables

	DOM_CR	I_GDP2	INF_RATE	GFCF	MILEX	POP	SECEX
Mean	93.4741	5.3332	3.3682	27.4480	2.7870	21111930	1.5511
Maximum	154.8921	5.9128	17.3290	43.5860	5.7852	32365998	3.0083

Minimum	22.5627	4.5683	-1.1387	20.5703	0.9607	11062434	0.8221
Standard Deviation	36.6931	0.3819	2.9469	6.5631	1.2977	6746580	0.5819
Observation	50	50	50	50	50	50	50
	DOM_CR	I_GDP2	INF_RATE	GFCF	MILEX	POP	SECEX
Mean	93.4741	5.3332	3.3682	27.4480	2.7870	21111930	1.5511

For the ARDL test, an integration of order one or zero, i.e. I(1), I(0) or both but not I(2), is necessary. Table 3 and table 4 present the unit root test results for equation 13 and equation 14.

Table 3. Unit root test model 1

	Level		First Difference		Second Difference		
Variable	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend	Order of Integration
DOM_CR	0.4526	0.7573	0.0000***	0.0000***	0.0000***	0.0000***	I(1)
GFCF	0.3901	0.3957	0.0004***	0.0015***	0.0000***	0.0000***	I(1)
I_GDP2	0.2515	0.2035	0.0000***	0.0000***	0.0000***	0.0000***	I(1)
LOG_POP	0.0113***	0.1574	0.5674	0.0329	0.6969	0.9203	I(0)
MILEX	0.3097	0.008***	0.0000***	0.0006***	0.0005***	0.0024***	I(1)
SECEX	0.1109	0.0403	0.0000***	0.0000***	0.0000***	0.0000***	I(1)

Table 4. Unit root test model 2

	Level		First Difference		Second Difference		
Variable	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend	Order of Integration
GFCF	0.3901	0.3957	0.0004***	0.0015***	0.0000***	0.0000***	I(1)
I_GDP2	0.2515	0.2035	0.0000***	0.0000***	0.0000***	0.0000***	I(1)
INF_RATE	0.0051***	0.0011***	0.0000***	0.0000***	0.0000***	0.0000***	I(1)
LOG_POP	0.0113***	0.1574	0.5674	0.0329	0.6969	0.9203	I(0)
MILEX	0.3097	0.008***	0.0000***	0.0006***	0.0005***	0.0024***	I(1)
SECEX	0.1109	0.0403	0.0000***	0.0000***	0.0000***	0.0000***	I(1)

The study proceeds with the ARDL Long Run Form and Bound Test. Pesaran et al. (2001) created the ARDL limits testing strategy to test the presence of a long run link between the variables. Table 5 and table 6 represents the results for bound test. The results for both tests performed indicated that the values of the F-statistics are higher than the upper bound of critical values at 10% under n=50 and I(1) condition, hence the null hypothesis is rejected.

Table 5. ARDL Long Run Form and Bounds Test model 1

Dependent Variable: I_GDP2		
Test Statistic	Value	k
F-statistic	6.069754	5
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.08	3
5%	2.39	3.38
2.5%	2.7	3.73
1%	3.06	4.15

Table 6. ARDL Long Run Form and Bounds Test model 2

Dependent Variable: I_GDP2		
Test Statistic	Value	k
F-statistic	4.229166	5
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.08	3
5%	2.39	3.38
2.5%	2.7	3.73
1%	3.06	4.15

The findings from ARDL Error Correction Regression indicate that the values of the F-statistics are higher than the upper bound of critical values at 10% under I(1) condition, hence the null hypothesis is rejected. It is confirmed that the variables have high relationship in the long run. Table 7 and table 8 represents the ECM results.

Table 7. ARDL Error Correction Regression model 1

Dependent Variable: I_GDP2

Test Statistic	Value	k
F-statistic	6.069754	5
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.08	3
5%	2.39	3.38
2.5%	2.7	3.73
1%	3.06	4.15

Table 8. ARDL Error Correction Regression model 2

Dependent Variable: I_GDP2		
Test Statistic	Value	k
F-statistic	4.229166	5
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.08	3
5%	2.39	3.38
2.5%	2.7	3.73
1%	3.06	4.15

Breusch-Godfrey Serial Correlation Lagrange Multiplier (LM) Test and Breusch-Pagan-Godfrey for Heteroskedasticity Test are used to measure of how well a line fits an individual data point. The closer a data point's residual is to 0, the better the fit.

Table 9. Breusch-Godfrey Serial Correlation Lagrange Multiplier (LM) Test model 1

Dependent Variable: I_GDP2	
Test Statistic	Value
F-statistic	1.668188
Obs*R-squared	6.576571
Prob. F(2,20)	0.2138
Prob. Chi-Square(2)	0.0373

Table 10. Breusch-Godfrey Serial Correlation Lagrange Multiplier (LM) Test model 2

Dependent Variable: I_GDP2	
Test Statistic	Value
F-statistic	1.248539
Obs*R-squared	4.118410
Prob. F(2,20)	0.3036
Prob. Chi-Square(2)	0.1276

The *p*-value for F-statistic (1.668188 & 1.248539 respectively) is higher than 0.10, hence null hypothesis is not rejected. There is no autocorrelation in the residuals generated from the regression model.

Table 11. Breusch-Pagan-Godfrey Test model 1

Dependent Variable: I_GDP2	
Test Statistic	Value
F-statistic	1.084131
Obs*R-squared	22.39348
Prob. F(2,20)	0.4213
Prob. Chi-Square(2)	0.3771

Table 12. Breusch-Pagan-Godfrey Test model 1

Dependent Variable: I_GDP2	
Test Statistic	Value
F-statistic	0.748281
Obs*R-squared	14.33042
Prob. F(2,20)	0.7313
Prob. Chi-Square(2)	0.6436

The corresponding *p*-value for F-statistic (1.084131 & 0.748281 respectively) is higher than 0.10, hence, we cannot reject the null hypotheses. The residuals generated from the regression model are homoscedastic.

When the plots of the CUSUM test and CUSUMQ test are placed at the critical boundaries at a significance level of 5%, the model is stable; otherwise, the model is extremely likely to break in its estimate phase (Bekhet and Othman, 2018). The Ramsey-RESET test was also used to check that the model's functional form was correct (Pata, 2018a, 2018b). All values are within the bounds of the 5% significance level, which signifies the model's stability over the study period.

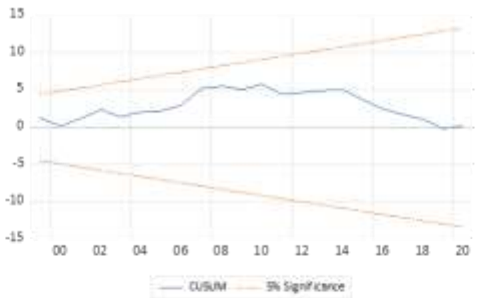

Figure 2: CUSUM analysis model 1

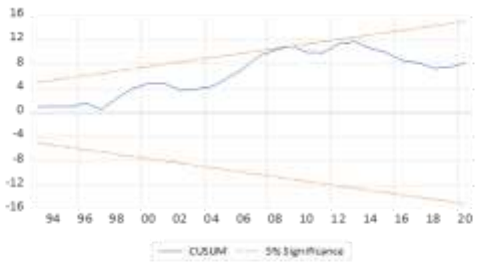

Figure 3: CUSUM analysis model 2

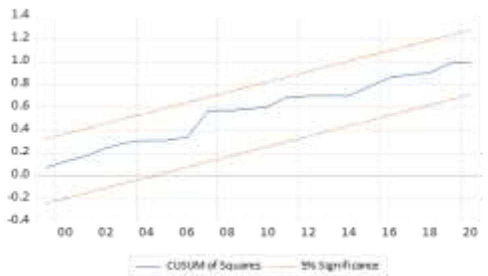

Figure 4: CUSUMSQ analysis model 1

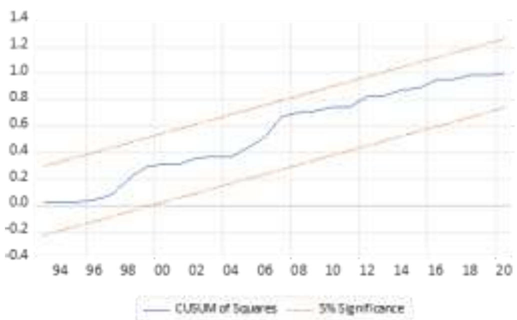

Figure 5: CUSUMSQ analysis model 2

The result for Ramsey-Regression Equation Specification Error (RESET) Test are:

Table 13. Ramsey-RESET Test model 1

	Value	df	Probability
t-statistic	0.600062	21	0.5549
F-statistic	0.360074	(1, 21)	0.5549
Likelihood ratio	0.782048	1	0.3765

Table 14. Ramsey-RESET Test model 2

	Value	df	Probability
t-statistic	0.825475	27	0.4163
F-statistic	0.681410	(1, 27)	0.4163
Likelihood ratio	1.171437	1	0.2791

The corresponding *p*-value for F-statistic (0.5549 & 0.4163 respectively) is higher than 0.10, hence null hypothesis cannot be rejectect which indicate that this model has a proper functional form.

5.0 Discussion

The objective of this study are to examine the impact of government security expenditure on economic growth. From the augmented Dicky-Fuller unit root test performed in previous section, we found that that all variables are integrated of order 1, I(1) except for LOG_POP. The critical measurement for these models is the dependent variables which is the initial capital as proxy to GDP, in this case is I_GDP2 is I(1), hence, fulfill the requirement for ARDL modelling (Pesaran et.al, 2001). The findings corroborates the use of ARDL as an estimation approach for determining the presence of a long-term relationship between these variables. Results show that the variables have significant relationship in the long run. The empirical results show that the approach is superior and consistently produces consistent results even with a small sample size. The results for both tests performed indicated that the values of the F-statistics are higher than the upper bound of critical values at 10% under *n=50* and I(1) condition. Furthermore, the significant short run relationship between the variables is shown in the error correction test. A series of diagnostic tests show that the estimated model is valid, and the CUSUM and CUSUMQ graphs show that the model is largely stable across the sample time. Finally, our findings suggest that long-term security spending fosters economic growth by offering a promising atmosphere for investment and a comfortable setting for manufacturing, which may draw in foreign investors.

6.0 Conclusion and Recommendations

This study shows the relationship between GDP (use I_GDP2) as proxy for initial GDP, GFCF as proxy for capital, Malaysia population as a proxy for labour, security expenses, military expenses and domestic credit. This study further to find the determinants with inflation rate factor and the result is there is significant relationship between GDP (use I_GDP2) as proxy for initial GDP, GFCF as proxy for capital, Malaysia population as proxy for labour, security expenses, military expenses and inflation rate. The critical ability of ministries and agencies involved in planning the distribution of national expenditure, especially related to security expenditure, is very much needed. Allocation of security expenses should not be in direct proportion to military expenditure because this situation will have a direct impact on the country's GDP development. The institutions like bureaucratic structures need to adapt for the economy to grow (Sengupta, 2014). With the latest rapid digital development, the Malaysian government can also create an independent entity to study in detail the methods of determining national expenditure by using artificial intelligence and machine learning.

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Paper Contribution to Related Field of Study

The paper contributes to the field of economics and national security.

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