

RESEARCH ARTICLE

Military spending and spillover effect on social welfare

Zarina Kassim^{1,*}, Zakiah Syamra' Suhaimi¹, S. Ananthan Subramaniam², Haliza Mohd Zahari¹,
Mohd Nor Yahaya¹

¹ Department of Logistic Management and Business Administration, Faculty of Defence Studies and Management, National Defence University of Malaysia, Sungai Besi Camp, Kuala Lumpur 57000, Malaysia

² Department of Management, Faculty of Defence Studies and Management, National Defence University of Malaysia, Sungai Besi Camp, Kuala Lumpur 57000, Malaysia

* **Corresponding author:** Zarina Kassim, zarina.kassim@upnm.edu.my

ABSTRACT

The Malaysian Ministry of Finance primarily aims to implement fiscal and financial policies for perpetual economic progress. It is vital to ensure the equitable distribution of national wealth to improve Malaysian citizens' well-being. Based on this study, the Malaysian government's strategy in defence allocation and spending demonstrates spillover effects on social welfare. Notwithstanding, this financial strategy must be self-sufficient in terms of resources to achieve economic scale through increased job creation and income generation. The current work utilised panel data to examine the defence spending effects on social welfare. A key finding was derived by applying the Autoregressive Distributed Lag (ARDL) model to fiscal time series data for 15 years (2008–2022). Specifically, defence allocations and expenditures reflected a spillover effect on social welfare. The empirical outcomes potentially catalyse the development of the National Defense White Paper in defence allocation and spending strategies and establish a novel independent paradigm in the National Defense Industry (NDI).

Keywords: trade-off effect; military spending; spillover effect; social welfare

1. Introduction

Communal aspirations for a non-colonised, prosperous, and fair life, also known as social development, allow community members to engage in development processes that induce a high-quality and dignified life^[1]. Malaysians have struggled to cope with mental safety and economic survival following the threat of the COVID-19 pandemic. Meanwhile, the government was compelled to make challenging decisions that require holistic and inclusive budget measures to balance social interests and safeguard the people's lives.

Given the essentiality of social development in building a quality life, the social development process plays a key role in ensuring that the implications of economic growth do not adversely impact other activities. Based on Asyurul et al.^[2], Malaysia began planning for the development of a social safety net to ensure that economic benefits are received by all social classes. The effectiveness of the policy in social welfare expenditures results from the availability of financial resources, which allows investments in education, health, the elevation of women's position, poverty eradication, and improved employment opportunities.

ARTICLE INFO

Received: 18 August 2023 | Accepted: 8 November 2023 | Available online: 21 December 2023

CITATION

Kassim Z, Suhaimi ZS, Subramaniam SA, et al. Military spending and spillover effect on social welfare. *Environment and Social Psychology* 2024; 9(2): 1990. doi: 10.54517/esp.v9i2.1990

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However, government spending needs to be managed and administered prudently and avoid large fiscal deficits. This is very necessary to enable the country to generate high and sustainable economic growth. Federal government debt until the end of 2022, amounting to RM 1079.6 billion or 60.4 percent to Gross Domestic Product (GDP). For that reason, National defence allocation and spending is a controversial issue for this reason, regardless of whether the fiscal policy promotes social welfare or otherwise. Extensive debates on the aforementioned topic have motivated this study to understand the significance of spending for the defence sector on Malaysian citizens' social welfare. Under Wagner's theory and the output-expenditure hypothesis, defence allocations and expenditures may impact the input of other social welfare sectors rather than the social welfare output. Numerous studies on the causal military spending-social welfare relationship revealed positive, negative, or no effects.

Scholars such as Asri et al.^[3] proposed strengthening the national fiscal policy if all sectors (including the defence sector) adopt the fiscal synchronisation hypothesis. This adoption simultaneously considers both revenue and expenditure items to plan and determine the government budget. Hence the reduction of fiscal deficit subsequently mitigates the dominance of bureaucrats to determine the budget following the interests of certain parties. This government action is deemed crucial to support the desired social investment, alleviate the conflict between social and private interests, and address foreign exploitation. This statement parallels the theoretical Keynesian view, in which the government is encouraged to actively intervene in fiscal and financial policy to ensure full employment, price stability, and economic growth. Effective demand or aggregate expenditure, which entails consumption, investment, government expenditure, and net exports, can affect economic growth.

The social sector was allocated a management expenditure estimate amounting to RM 95.97 billion in the 2022 Malaysian Government Budget, which involves distribution to eight subsectors. The data from Department of Statistics Malaysia, Ministry of Economy^[4] shown in **Figure 1** that the Malaysian government's emphasis on human capital development at all levels and in every national development is translated through the distribution of the largest allocation under the education and training subsector, with an allocation of RM 59.35 billion. Additionally, the government focuses on the people's health aspects by providing optimal, accessible, and affordable healthcare services. For example, the health and population subsector was allotted RM 28.32 billion, the second-highest managing allocation under the social sector.

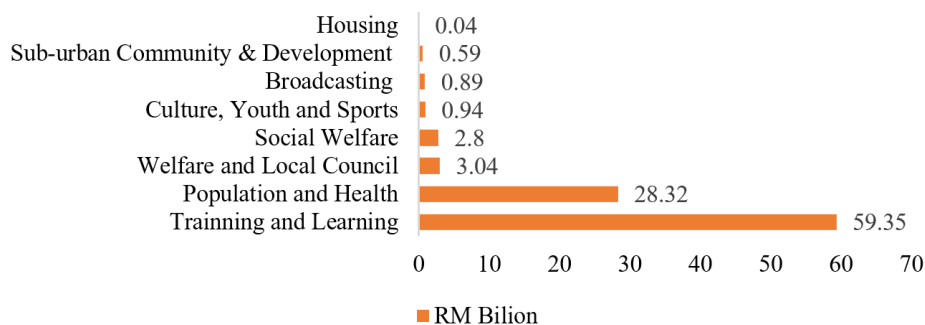


Figure 1. Distribution of estimated expenses to manage 2022 social sector^[4].

The Security Sector was allocated RM 33 billion, which was distributed to two subsectors: homeland security (RM 17.0 billion) and defence (RM 16.0 billion)^[4] (see **Figure 2**). The 2022 budget allocated the highest amount to the Malaysian security and defence sector since the 9th Malaysia Plan (RMK-9). Assertions of allocating to an apparently inactive security and defence sector that hardly contributes to the country's social welfare are unfounded. It is deemed vital to improving the readiness of the government's primary assets and machinery via the national security and defence sector in case of a national security threat. For example, the

National Disaster Management Agency’s level of preparedness determines the ease with which flood victims’ burdens can be reduced via food kits, basic necessities, and evacuation sites. The Malaysian government is also constantly improving security controls against threats of foreign invasion at every national border. Furthermore, global military spending, which has increased following the war between Russia and Ukraine, and the depreciation of the Malaysian Ringgit are key determinants of expenditure in the defence sector. This means, the Malaysian government still maintains the expenditure budget according to current needs.

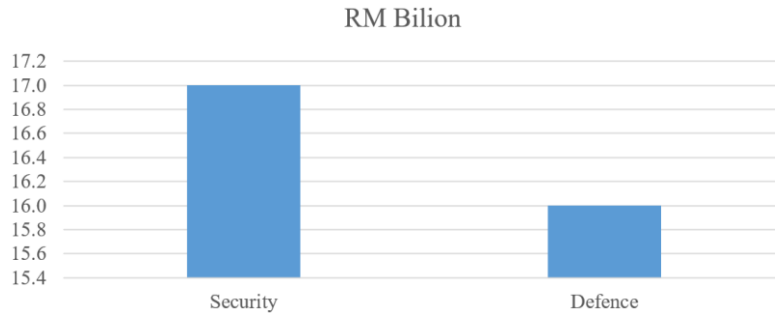


Figure 2. Estimated distribution to manage 2022 security sector expenditure.

The Malaysian Ministry of Defence (MINDEF) highlights the (i) purchase of new assets, (ii) maintenance of existing assets, (iii) defence of military veterans, and (iv) improvement of defence citizens’ welfare as the four key aspects in spending allocations. Specifically, the use of high-technology military defence assets and tools (fighter jets, armoured cars, radar systems and high-quality and high-performance weaponry) incurs a substantial amount. The high reliance on defence assets is one of the factors that increase spending in the national defence sector. European countries, have dominated the global defence industry^[5] by producing sophisticated defence assets owing to scientific and technological advancements in weaponry and defence technology. As such, a country potentially optimises its defence industry through a strong national defence policy amidst internal and external threats to the country. Figure 3 depicts the Malaysian government’s spending trend on the national defence sector from 1997 to 2022^[6].

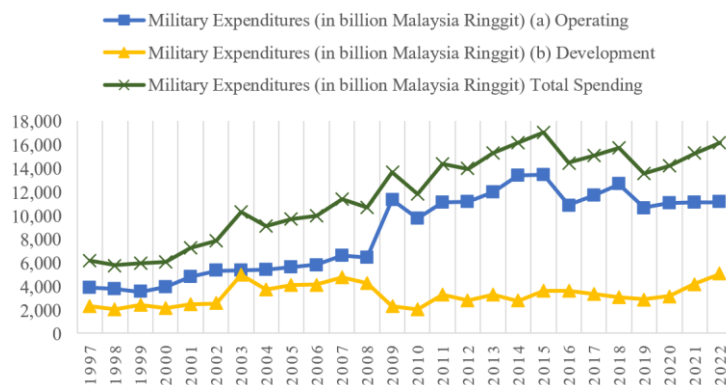


Figure 3. Malaysia’s military expenditures from 1997 to 2022.

The study findings provided the people (specifically academicians) with useful insights into the fiscal policy on defence allocation and expenditure in Malaysia, which directly or indirectly affects social welfare. Despite having no direct or tangible impact in terms of national output or economic growth, the defence sector must perpetually demonstrate a high level of readiness. This sector must be at par with the dynamic use of equipment and technology in defence and security and bear the cost of purchasing tools from foreign countries.

In line with the empirical outcomes, national defence allocations and expenditures may reveal an impact on social welfare. The study implications also catalysed the development of a more competitive and sustainable

local defence sector. In other words, the Malaysian defence sector requires much innovation to encourage the supply of locally-produced assets for the overall defence field, increase savings in defence spending, reduce dependence on foreign countries, and improve Malaysian citizens' social welfare.

2. Literature review

2.1. Malaysian defence expenditures

Defence spending in Malaysia has increased from 6.13 million in 1997 to 16.14 million in 2022, with an average growth rate of 62%. The country has spent an average of USD 4 billion annually on defence in the past 10 years. Unsurprisingly, the allocation and expenditure of Malaysian defence in terms of whether the fiscal policy promotes social welfare and has a multiplier effect on the Malaysian economy or vice versa is a debatable issue. Although Malaysia has increased the defence budget allocation, the amount remains relatively small compared to other countries, such as Indonesia and Singapore^[7]. Following past works, 70% of the defence budget is allocated to the MAF management aspect. Only 30% is spent on defence development^[8].

This finding explains the limited local innovation capability^[9] and outdated equipment in the defence^[8]. Furthermore, the lack of success in commercialising R&D products could justify the insufficient defence budget according to Balakrishnan and Johar^[9]. Balakrishnan and Johar claimed that only several R&D products, such as meat bars, a water hydration backpack, and a soft body armor vest were successfully commercialised under the Science & Technology Research Institute for Defence (STRIDE) projects. A high defence budget is integral to equipping MAF with the latest equipment and ensuring the successful execution of relevant activity and operations.

Study in China revealed a significant increase in the Chinese government's expenditure on the defence sector at an average annual growth rate of 30.60% (an increase from USD 7313 million to nearly USD 3.65 billion in 2013 and 1997, respectively) in the past two decades, which has garnered global attention^[10]. The study also discovered the continuously widening income gap among the Chinese population. China can reduce this gap by having its defence sector increase wages and financially aid retired service personnel, children's education, and their parents' medical care for the less educated in the military sector^[11].

Research on Malaysia's defence expenditure remains lacking. Most past studies performed a comparative analysis between countries. For example, Safdari, Keramati and Mahmoodi^[12] employed ARDL bounds testing to assess the robustness of the causal effect between military spending and economic growth from 1988 to 2006 in four Asian countries: two industrialised nations (South Korea and Malaysia) and two developing ones (Iran and Saudi Arabia). Resultantly, military spending could affect national economic growth. Developing economies did not portray a meaningful relationship between military spending and economic growth, while their industrialised counterparts revealed a one- or two-way relationship between military spending and economic growth.

Malaysia must rely on its own resources and capabilities (logistics support, human resources, and the defence industry) to maintain its sovereignty, independence, and territory with self-sufficiency^[13]. The Malaysian Defense White Paper^[14] highlighted the steps undertaken to continue the long-term defence strategy, improve defence capabilities, and strengthen togetherness across the Malaysian Armed Forces (MAF) and other security agencies. Given the increase in national defence expenditure over two decades, Malaysia needs to guarantee a strong continuity of development in the Malaysian defence sector through the principle of independent defence. This principle would ensure the relevance of each component in the country's defence and security development allocation and expenditure.

The aforementioned principle would positively impact the development context by reducing import

activities and national defence expenditure. Study in Malaysia confirmed the presence of Wagner's theory and the revenue-spend hypothesis for the Malaysian defence sector^[3]. The existence of this theory for a sector implies that increased national income elevates public expenditure in the sector involved, while the degree of component productivity contributes to the increase in national output. Under the revenue-expenditure hypothesis, high government revenue subsequently increases government expenditure.

2.2. Spillover effect

Spillover effects denote the economic, social, or political effects experienced by a country, region, or worldwide following the occurrence of an event. This effect can demonstrate positive or negative effects that induce a social crisis or shock in the market. A positive spillover effect occurs when an entity or event leads to good or alleviates bad effects, while a negative spillover effect adversely influences social, political, environmental, and economic behaviour.

Local studies on spillover effects stem from various contexts, with much emphasis placed on market spillover effects. For example, Trihadmini and Falianty^[15] examined the effects of spillover and contagion from the developed stock market to the stock market in five ASEAN countries with the DCC-GARCH model. The study results highlighted a significant increase in the DCC coefficient (DCC's coefficient) throughout the economic crisis and affirmed the effect of contagion from the developed stock market on the five ASEAN countries (excluding the Dow Jones Index to PSEI Philippines and HIS to KLSE). Except for Malaysia, the spillover effect for the four ASEAN countries during the crisis period was greater than in the pre-crisis period. Meanwhile, the volatility effect on the movement of stock returns in the five ASEAN countries was smaller throughout the crisis period.

In Malaysia, Submitter, Yunus and Wahob's investigation^[16] involving the effect of technology and knowledge spillover of Foreign direct investments (FDIs) on labour productivity discovered that the effect of knowledge spillover (spillover knowledge) from all investor countries proved more effective than technology spillover. Meanwhile, Buigut, Kapar and Braendle^[17] examined the impact of regional terrorism events on Malaysian tourism demand. Resultantly, the rise of terrorist activities in Malaysia has significantly impacted international arrivals to the country. The spillover effect caused by terrorist activities from neighbouring countries (Thailand and Indonesia) also affected the arrival of tourists, particularly from Europe, North America, Oceania and the Asian Region, to Malaysia.

This study perceived the spillover effect from the perspective of the trade-off effect between military expenditure and social welfare expenditure. The government's failure in terms of spending perceivably occurs when expenditures on goods and services are inappropriately used and distributed. As no price is factored into all the benefits and costs involved when providing military goods and services, government spending is one of the most important variables underpinning the fiscal budget and national income accounting. Overall, national defence allocation and spending with regards to whether this fiscal policy can promote social welfare and have a multiplier effect on the national economy or vice versa remains debatable.

Despite the paucity of local studies on the spillover effects of military sector spending, especially on social welfare, some global studies have examined the spillover effects from the defence sector in the country. Oukhallou^[18] evaluated the impact of military spending on development in 77 countries from various regions and income groups. Consequently, a positive economic spillover was identified from military spending in military research and development. A negative economic spillover effect was disclosed in high- and middle-income countries with the reduction of public investment following unproductive military imports. Other studies investigated the effects of economic spillover from military investment on social welfare, albeit from a health perspective. For example, Khan, Su and Rizvi^[19] implied that countries with low expenditure on the

defence sector encompass a population with relatively high life expectancy and low infant mortality rates.

3. Methodology/materials

This section presents the current study methodology to investigate the spillover effects of defence sector spending on social welfare. The ARDL model used to separate the long-run and short-run effects, and to test for cointegration or, more generally, for the existence of a long-run relationship among the variables of interest. This study was made by varying the income and expenses to the main components or combinations of main components as described in the previous data specification section. Then, it allows us to identify whether there is a long-term and short-term relationship between revenue, expenditure and output. Next, this study will examine all the equations above using the ARDL model as suggested by Pesaran et al.^[20], since the main objective of this study is to identify the long-term relationship between revenue, public spending and output.

However, first the stationarity test needs to be done to test the presence of a unit root in the time series, so the Augmented Dickey-Fuller (ADF) test was used. To confirm the results of the ADF test, this study also performed the Phillip Perron (PP) stationarity test. Next, for the purpose of estimating the ARDL model, the following three steps must be followed. The first step is to estimate the long-run relationship (cointegration) among the time series variables. Generally, the null hypothesis and hypothesis alternatives are tested using the F-statistics test to identify whether there is cointegration or not.

H0: no cointegration: $(\pi_1 = \pi_2 = 0)$.

H1: there is cointegration: $(\pi_1 \neq \pi_2 \neq 0)$.

If the estimated value of the F statistic exceeds the critical value of the upper bound (upper bound critical value), then the null hypothesis must be rejected, which explains the existence of a long-term relationship (cointegration) among the time series variables. On the other hand, if the estimated F statistic value is less than the lower bound critical value, then the null hypothesis fails to be rejected. In addition, if the estimated value of the F statistic is between the critical value of the lower limit and the upper limit, then it cannot be identified whether there is cointegration or not because the degree of integration of the explanatory variables is not clearly known.

Notably, Pesaran et al.'s ARDL method was used to perceive the existence of a long-term relationship (cointegration) between military allocations and spending on social welfare spending in Malaysia^[20]. Additionally, Grossman's econometric model^[21] in the study of healthcare theory, which considers the spillover effect function on various factors, was included as follows:

$$\text{Healthcare outcome} = f(\text{input variables})$$

Otherwise,

$$\text{Health outcome} = f(\text{economic factors, social factors})$$

Input variables entail economic factors of defence expenditures (DE), GDP per capita (GDP), and social factors: number of agents (NOA), number of policies (NOP), net contributions (NC), net investment income (NII), β and δ is a short run coefficients and λ is a long run coefficients.

To test the cointegration, the ARDL model is expressed as Equation (1):

$$\Delta DE_t = \alpha + \beta_1 \Delta DE_{t-1} + \beta_2 \Delta GDP_{t-1} + \beta_3 \Delta NOA_{t-1} + \beta_4 \Delta NOP_{t-1} + \beta_5 \Delta NC_{t-1} + \beta_6 \Delta NII_{t-1} + \sum^a I = 1 \lambda t \Delta DE_{t-i} + \sum^b i = 0 \delta_1 \Delta GDP_{t-i} + \sum^c i = 0 \delta_2 t \Delta NOA_{t-i} + \sum^d i = 0 \delta_3 \Delta NOP_{t-i} + \sum^e i = 0 \delta_4 \Delta NC_{t-i} + \sum^f i = 0 \delta_5 \Delta NII_{t-i} + \zeta \quad (1)$$

Based on Equation (1), the hypothesis test presented below must be performed to identify the existence of a long-term relationship between the variables in Equation (1):

H0: No cointegration ($\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$)

H1: There is cointegration ($\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0$)

This study performed a panel cointegration analysis to determine the presence of a long-term effect relationship, with emphasis on data for 15 years (2008–2022) via time series data. The derived data were tested for stationarity through the Augmented Dickey-Fuller (ADF) test, one of the test types commonly used to identify the unit root in the time series data. This stationarity test proved necessary, as the study data took the form of time series to avoid false regression estimates. Although a spurious regression estimate implies a very good regression estimate result, this estimate does not reflect the true relationship. This problem was detected through the confidence level (R^2) and Durbin-Watson (DW) values. A non-stationary estimated data denotes an R^2 value that exceeds that of DW. The estimated time series data proved inconsistent with a non-stationary variable due to the data variance, mean, and covariance values.

The disturbance factors were assumably uncorrelated based on the ADF test. In this study, the stationarity test was performed first pre-cointegration analysis. The second step involves estimating the ARDL model upon confirming the existence of cointegration by considering the error correction term (ECT) elicited from the long-term model estimation. The ECT coefficient values can explain two things: (i) measurement of the adjustment speed towards long-term equilibrium, which is the time taken by the explanatory variable to converge towards long-term equilibrium; (ii) the long-term causal direction among the explanatory variables of the dependent variable.

4. Results and findings

This section discusses the test results with the ADF method, cointegration test, and long-term ARDL model test. Based on the ADF and PP tests that have been done beforehand, it was found that all the time series variables reach stationarity at the first difference level, $I(1)$, which is at various levels of significance. However, the test results table is not included in this paper since the variables tested are many but the results obtained are uniform. While, the results derived from cointegration testing the ARDL method, or ‘bound testing’ (see **Table 1**), determine the existence of cointegration. Meanwhile, the F-statistic value obtained from the hypothesis test was compared to the critical value from table case III: unrestricted intercept and no trend in Narayan^[22].

Table 1. The F-statistic cointegration test results.

Equation	Dependent variable	F-statistic value	Equation	Independent variable	F-statistic value
9	Δ GDP	9.3685*	197	Δ NOP	4.3820***
10	Δ GDP	9.3936*	198	Δ NC	4.6858***
34	Δ GDP	9.2454*	206	Δ NII	4.0973***
39	Δ GDP	9.2147*	211	Δ DE	4.1450***
41	Δ DE	5.3798**	218	Δ NOP	4.5789***
154	Δ DE	6.1257**	258	Δ NC	4.5460***
158	Δ DE	6.7452**	259	Δ NII	4.4671***

Cointegration existed for equations 9, 10, 34, and 39, whereas equations 41, 154, and 158 reflected significant F-statistic values at various levels of significance for defence expenditure and social factors. Based on the equation, a long-term relationship existed between dependent and independent variables. The following step serves to estimate long-term coefficients following the ARDL model, solely for equations that pass the F-statistics test.

Equation 22 in **Table 2** denotes that DE is significant and affects NOP and NC. Although DE did not directly affect the social welfare output, as evidenced in Wagner’s theory and the results-expenditure hypothesis, DE impacted the input of the health welfare sector through increased policies and net contributions. Following equation 25, GDP was significantly positively related to NOA and NII. The income per capita impacted the number of agents and net investment income.

Table 2. Long-term coefficient estimation results following the ARDL model.

Equation	ARDL conditional model	Dependent variable				
		NOA	NOP	NC	NII	C
22	{1,1,0,0}		0.2			
(DE)			(2.34)**			
24	{1,0,0,1,0}		0.1	0.15		-0.14
(DE)			-2.02	(2.11)**		(-1.78)
25	{1,2,0,0}	0.68	0.49			
(GDP)		(0.74)**	1.84			
26	{1,0,0,2}			0.25	2.56	
(GDP)				-1.03	(2.12)**	

Note: *Significant at the 1% significance level, ** Significant at the 5% significance level, *** Significant at the 10% significance level. Values in parentheses refer to the t-statistic.

5. Discussions

From previous studies, the Malaysia’s defense sector proves that military expenditure is negatively affected by the amount of revenue and expenditure on managing the defense sector and positively affected by Gross Domestic Product. This is affected by the allocation that is more for operating expenditure will reduce the allocation for development expenditure and vice versa, while the increase in national income which shows the vibrancy of economic activity in the country demands more allocation to protect the sovereignty and borders of the country from the threat of bad external elements. Until now, although the defense sector has not given a direct impact in the form of output and economic growth of the country that can be seen, it should be noted that the defense sector must always be in the highest state of readiness.

The dynamism of the use of equipment and technology in defense and security requires this sector not to be left behind despite having to bear the expense of purchasing equipment from foreign countries. In this view, a new paradigm to self-reliance defence industry is possible if local resources are used. Malaysia’s fiscal policy will remain expansionary to stimulate the economy, with Budget 2023’s initiatives focused on speeding up recovery, strengthening economic resilience, and catalyzing reforms. All these initiatives are in line with the themes and core thrusts of the recently announced Twelfth Malaysia Plan^[4]. Additionally, Malaysia must depend on its own resources and capabilities to safeguard its sovereignty, independence and territorial integrity^[13]. Furthermore, the Malaysian government needs to refine a strategy in a holistically manner involving all the interested parties for the future needs of the country’s security and defence; and aligning it with the necessary capabilities development of the Malaysian Armed Forces that can assuredly safeguard the country’s sovereignty and integrity, and the country’s survivability in times of major powers conflicts.

6. Conclusion

Following past empirical works, Wagner’s theory exists in significant defence sector spending. High national income potentially increased public spending in the sector involved. As Malaysia remains reliant on imports, the distribution of expenses for the defence sector proved costly. Most of the defence equipment, new

assets, and logistic expenses in this sector were expensive. The fall of the Ringgit and economic and political factors also affected defence sector spending in Malaysia. As such, Malaysia must always be prepared to defend its sovereignty from external threats. Malaysia continues to encounter security threats from militant groups in Sabah and other issues of piracy, overlapping claims, political unrest, and illegal immigrants.

The incidents of Pulau Sipadan and Pandanan have caused Malaysia to spend RM 6 billion for improved security in Sabah. Specifically, five army battalions, five battalions, 30 naval patrol boats, and five Hawks jets were added to control Sabah waters. Only defence spending enables the country to safeguard its borders through sophisticated equipment, warships, and warplanes. Despite the exorbitance of purchasing equipment from foreign countries, the dynamic use of equipment and technology in defence and security allows this sector to be at par with other nations.

The current study implications led to the development of a more competitive and sustainable local defence sector. Overall, for the policy recommendation, the Malaysian defence sector requires much innovation to promote the supply of local equipment for the defence field. This study also will contribute to the development of National Defence White Paper in developing a new paradigm of Self-Reliance National Defence Industry. This strategy increased savings in defence spending while concurrently reducing dependence on foreign countries for improved social welfare. There is some of limitations for this research. This study only examines the spillover effect on social welfare. Besides that, in the context of social welfare, this study only takes into account the healthcare outcome aspect.

Author contributions

Conceptualization, ZK; methodology, ZK; software, ZK; validation, MNY, SAS and HMZ; formal analysis, ZK; data curation, ZSS; writing—original draft preparation, ZK; writing—review and editing, ZK and ZSS; visualization, ZK; project administration, ZK; funding acquisition, ZK. All authors have read and agreed to the published version of the manuscript.

Acknowledgments

This research work is supported by the Project UPNM/2022/GPJP/SSK/4.

Conflict of interest

The authors declare no conflict of interest.

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