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DOES MILITARY EXPENDITURE PROMOTE ECONOMIC GROWTH AND SOCIAL WELFARE? THEORETICAL AND EMPIRICAL EVIDENCE IN TAIWAN

Abstract. *This study aimed to investigate the effects of expanding the ratio of military expenditure on economic growth and social welfare. We constructed an endogenous growth model and employed an autoregressive distributed lag bounds test approach to avoid the implicit endogeneity and hetero-homogeneous problem. A comparison of the theoretical and empirical test results showed that increased military expenditure will lead to a lower economic growth, and a higher ratio of military expenditure may decrease social welfare. These findings, in view of achieving economic performance or social welfare, may also explain the advocacy related to arms race (guns) and disarmament (butter) issues in recent decades, as well as provide guidance to policy makers when setting priorities in the government's spending.*

Keywords: Military expenditure; Economic growth; Social welfare.

JEL Classification: C51; O47; I38

1. Introduction

Scholars have debated for several decades whether military expenditure can lead to social welfare improvement or economic growth. Regarding this undetermined issue, proponents view military expenditure as public investment, whereas others consider it a form of social cost that may compete with the benefits of social welfare. In the context of limited resources for public programs, each program competes for budgetary allocations, and one's win means another's loss. Meanwhile, when seeking sustainable economic growth, the government must consider the trade-off effect between military expenditures and social welfare, given budget constraints (Scheetz, 1992; Yildirim and Sezgin, 2002). According to Keynesian framework, an increase in military expenditure can promote social welfare by stimulating the aggregate market demand (Kollias and Paleologou 2011; Lin *et al.*, 2015). This longstanding 'guns-and-butter' debate affects the government's budget allocation; that is, whether to spend its budget on 'butter' for

residents or ‘guns’ for defence spending. Studies supporting the ‘guns-and-butter’ debate have explained that military expenditures may render negative influences on social welfare by disproportionately taking up the demand side of output (i.e. personal consumption, investment, and government spending), leading to less public spending on human capital accumulation and ultimately impeding economic growth and indirectly bringing losses to social welfare.

Military expenditure can affect social welfare or economic growth through the crowding out effect, although the empirical findings are not unanimous. The pioneering work of Russett (1969) showed a negative relation between military expenditures and social welfare based on time series data of Canada, France, the UK, and the US. This negative relation has been supported by later empirical studies (Peroff and Podolak-Warren, 1979; Domke *et al.*, 1983; Deger, 1985; Ozsoy, 2002; Yildirim and Sezgin, 2002). By contrast, some scholars have argued that the expansion of military expenditures may lead to a positive effect on economic growth and welfare (Verner, 1983; Lindgren, 1984; Harris and Pranowo, 1988; Ram, 1995; Kollias and Paleologou, 2011; Lin *et al.*, 2015). Military expenditure is believed to be not only helpful to social welfare through the accumulation of well-trained human capital but also technological innovation and spin-off effects in the defence sector. Meanwhile, several empirical studies have found no trade-off effects between military expenditure and social welfare, revealing instead that increased military expenditures have different impacts on the indirect channels, such as income inequality, economic growth, and unemployment rate (Tiwari and Shahbaz, 2011; Ali, 2012; Malizard, 2014; and Azam, *et al.* 2015). These studies suggest that budgetary allocation for public spending or military expenditure exhibits disparate or specific determinants. Thus, expanding military expenditure by sacrificing social welfare might not be an appropriate public policy.

Most of the existing studies regarding the ‘guns-and-butter’ debate have mainly utilized time-series or cross-section data with single or multiple countries. Limited research has completed prior theoretical assertions of variables’ endogeneity. Notably, neglecting the endogenous problem between variables may lead to a hetero-homogeneous problem. Thus, our study attempted to fill this gap in literature by constructing a theoretical endogenous model and employing the autoregressive distributed lag (ARDL) bounds testing approach to explore the variables’ endogeneity in regressions. This approach has many advantages over the alternatives. First, it allows regressions to be stationary irrespective of whether the variables in regressions are $I(0)$ or $I(1)$. Second, it has better properties for avoiding the low-power problem in detecting long-run relations even where the sample size is inevitably small (Narayan, 2004, 2005). Finally, all variables are assumed to be endogenous based on an explicit unbiased estimate (Harris and Sollis, 2003). To the best of our knowledge, few studies have simultaneously used the theoretical endogenous model and empirical ARDL approach to compare the effectiveness among military expenditure, economic growth, and social welfare, and none have focused on Taiwan.

2. Theoretical Model

Suppose that a closed economy is composed of a representative household and a government (Barro and Sala-I-Martin, 1995; Futagami *et al.*, 1993), and the household produces a single composite commodity that can be consumed, paid for as income tax, or accumulated as capital. The government can finance its spending for core infrastructure and military expenditure by collecting income tax. Following Lin's (2016) framework, we assumed that the growth rate of the population is constant over time and the representative, infinite-lived household seeks to maximize the overall utility function:

$$\int_0^{\infty} U(C, ME) e^{-\delta t} dt = \int_0^{\infty} (\ln C + \beta \ln ME) e^{-\delta t} dt, \quad \beta > 0, \quad (1)$$

where C is consumption per capita, ME represents military expenditure, δ is the time preference with a constant positive rate, and parameter β measures the effect of military expenditure on the welfare of the household. The government's military expenditure is embedded in the household's utility function because it improves the country's defensive ability and public security.

At each time instance, the formation of the household's capital accumulation (savings) can be represented by the difference between its net disposable income and consumption. Therefore, the household's budget constraint is given by

$$\dot{B} = (1 - \theta)Q - C, \quad 0 < \theta < 1 \quad (2)$$

where the dot over private capital B denotes the rate of change over time. Q is the output, and θ denotes a flat rate for income tax. Public services may create a positive impact on private production as a spin-off effect, such as infrastructure, highways, and power utilities (Futagami *et al.*, 1993; Turnovsky, 2000b). Therefore, we take output Q in its Cobb–Douglas form in constant returns to scale technology:

$$Q = Q(B, R) = \eta B^{1-\lambda} R^{\lambda}, \quad 0 < \lambda < 1; \quad \eta > 0 \quad (3)$$

where B and R denote private capital and public services stocks, respectively. As for the representative household, it maximizes the discounted sum of the utilities of consumption in Eq. (1) subject to Eqs. (2) and (3) to derive the demand side. Thus, the discounted Hamiltonian function can be characterized as

$$H = \ln C + \beta \ln(ME) + \psi \left((1 - \theta) \eta B^{1-\lambda} R^{\lambda} - C \right) \quad (4)$$

The first-order optimum conditions for the household are as follows:

$$1/C = \psi \quad (4a)$$

$$-\dot{\psi}/\psi + \delta = (1 - \lambda)(1 - \theta) \eta B^{-\lambda} R^{\lambda} \quad (4b)$$

$$\dot{B} = (1 - \theta) \eta B^{1-\lambda} R^{\lambda} - C \quad (4c)$$

where ψ is the costate variable that reflects the marginal price of the private capital stock measured in utility terms. Eqs. (4a) to (4c) then give

$$-\dot{\psi}/\psi = (1-\lambda)(1-\theta)\eta B^{-\lambda} R^{\lambda} - \delta \quad (5)$$

The formation in Eq. (5) is the so-called Keynes–Ramsey rule, which indicates that if the net marginal capital production is higher than the time preference (δ), then the household will increase their next-period consumption.

As for the government, we assume that it totally allocates its income tax collection for public spending (PS) on core infrastructure and military expenditure (ME). Thus, the government's balanced budget at each instance of time is given by

$$PS + ME = \theta Q \quad (6)$$

Let ω and $1-\omega$ denote the share of the government's expenditure allocated for PS and ME , respectively. Therefore, the linkage between the total public capital stock ($\dot{R}$) and the share of core infrastructure expenditures ($\omega\theta Q$) can be denoted as

$$\dot{R} = PS = \omega\theta Q \quad (7)$$

According to the balanced growth equilibrium, private consumption and both private and public capital stock will all grow at the same rate (Barro and Sala-I-Martin, 1995). To capture the path of the dynamic system, we define two transformed variables $\mu = R/B$ and $\sigma = C/B$ together with Eqs. (4c), (5), and (7) to formulate equations for the economy's transitional dynamics system:

$$\dot{\mu}/\mu = F(\mu, \sigma, \omega) = \sigma + \omega\theta\eta\mu^{\lambda-1} - (1-\theta)\eta\mu^{\lambda} \quad (8)$$

$$\dot{\sigma}/\sigma = J(\mu, \sigma, \omega) = \sigma - \delta - \lambda(1-\theta)\eta\mu^{\lambda} \quad (9)$$

Eqs. (8) and (9) denote the economy's transitional dynamics system (Buiter, 1984; Turnovsky, 1995). To prove the existence of a unique perfect-foresight equilibrium (convergence stability in the steady state), the economy system is characterized by $\dot{\mu}/\mu = \dot{\sigma}/\sigma = 0$, where ν_1 and ν_2 are the characteristic roots in reduced form, and $\hat{\mu}$ and $\hat{\sigma}$ symbolize their stationary values, respectively. In Eq. (10), these counter signs of the characteristic roots verify the convergence condition of a unique perfect-foresight equilibrium:

$$\nu_1\nu_2 = F_{\mu}J_{\sigma} - F_{\sigma}J_{\mu} = \eta(1-\lambda)(\omega\theta + \lambda(1-\theta)\hat{\mu})\hat{\mu}^{\lambda-1}\hat{\sigma} < 0 \quad (10)$$

3. Long-term effects of economic growth and social welfare

We examined the long-term effects on the balanced growth rate of economic growth and social welfare following a change in the share of public spending (ω).

Proposition 1: An increase in the share of the public spending (military expenditure) will lead to higher (lower) economic growth.

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Based on the reduced form of $\dot{\mu}/\mu = \dot{\sigma}/\sigma = 0$ at the steady state, by differentiating Eqs. (8) and (9) with respect to ω , we can obtain the following steady-state equilibrium as the change in the share of public spending:

$$d\hat{\mu}/d(\omega) = (-\theta\eta\hat{\mu}^\lambda\hat{\sigma})/v_1v_2 > 0 \quad (11)$$

$$d\hat{\sigma}/d(\omega) = (-\theta(1-\theta)(\eta\lambda)^2\hat{\mu}^{2\lambda-1}\hat{\sigma})/v_1v_2 > 0 \quad (12)$$

where $\hat{y}$ is the steady-state growth rate, and $\hat{y} = \dot{Q}/Q = \dot{C}/C = \dot{B}/B = \dot{R}/R$ holds in the steady-state growth equilibrium. Thus, along with Eq. (8), we have

$$\hat{y} = \dot{R}/R = \omega\theta\eta\hat{\mu}^{\lambda-1} \quad (13)$$

After differentiating Eq. (13) and combining with Eqs. (11) and (12), we obtain the steady-state growth equilibrium relation:

$$d\hat{y}/d(\omega) = \left[\left(\lambda\theta(1-\theta)\eta\hat{\mu}^\lambda \right) / (\omega\theta + \lambda(1-\theta)\hat{\mu}) \right] > 0 \quad (14)$$

Eq. (14) shows the theoretical evidence that an increase in the share of public spending will increase the economic growth rate. Meanwhile, it implies that an increase in the share of military expenditure will weaken the economic growth. More specifically, if the government wants to achieve the maximum growth rate, a feasible policy is to allocate its budget from military expenditure to public spending.

Proposition 2: An increase in the share of public spending (military expenditure) will lead to lower (higher) social welfare.

To investigate the share effect of public spending on social welfare, we followed the derivation of social welfare suggested by Greiner and Hanusch (1998). Suppose that B_0 is the initial private capital, the growth time path of private consumption and level of military expenditure can be denoted as $C_t = C_0 e^{\hat{y}t}$ and $(ME)_t = (ME)_0 e^{\hat{y}t}$, respectively, where C_0 and ME_0 are determined by the economy's system endogenously. Thus, we obtain

$$C_0/B_0 = (1-\theta)\eta\hat{\mu}^\lambda - \hat{y} \quad (15)$$

$$M_0/B_0 = (1-\omega)\eta\hat{\mu}^\lambda \quad (16)$$

By substituting Eqs. (15) and (16) into Eq. (1), and integrating the representative household's welfare ($A(\omega)$) over an unlimited planning horizon, we obtain

$$A(\omega) = (1/\delta) \left(\ln C_0(\omega) + \beta \ln M(\omega) + \delta^{-1}(1+\beta)\hat{y}(\omega) \right) \quad (17)$$

To explore the welfare effect as the change in ω along the sustainable growing path, we differentiate Eq. (17) with respect to ω :

$$\partial A/\partial \omega = (1/\delta) \left[(-\beta/(1-\omega)) + (1/C)(\partial C_0/\partial \omega) + (\beta/Q_0)(\partial Q_0/\partial \omega) \right] + ((1+\beta)/\delta)(\partial \hat{y}/\partial \omega) \quad (18)$$

On the right hand side of Eq. (18), if ω is ultimately approaching to one, then the embedded term $-\beta/(1-\omega)$ will be close to negative infinity, which dominates the other three partial differentiation terms. Thus, an increase in the share of public spending (ω) will lead to lower social welfare. This result also implies that if the government distributes more shares to military expenditure ($1-\omega$), then it will ensure higher social welfare.

4. Empirical Analysis

We investigated whether military expenditure has a long-run impact on economic growth and social welfare. To test the validity of the theoretical model in sections 2 and 3, we employed the following general empirical regression model:

$$\ln(Y)_t = a_0 + a_1 \ln(PS)_t + a_2 \ln(ME)_t + \varepsilon_{1t} \quad (19a)$$

$$\ln(SW)_t = b_0 + b_1 \ln(PS)_t + b_2 \ln(ME)_t + \varepsilon_{2t} \quad (19b)$$

where Y stands for gross domestic product (GDP), PS is public spending, SW represents social welfare expenditure, ME represents military expenditure, and ε_t is the error term. All variables were taken in their natural logarithms prior to conducting the empirical analysis. We obtained the empirical data for GDP from the World Bank. Data of social welfare and military expenditure are obtained from National Statistics of Taiwan and SIPRI (*Stockholm International Peace Research Institute*) Military Expenditure Database, respectively. All of the above data are collected from 1991 to 2020.

4.1 Unit root test using Augmented Dickey–Fuller

Before testing the long-term relations in Eqs. (19a) and (19b), we conducted the unit root test of Augmented Dickey–Fuller (ADF) (1979) to test the variables' stationarity, considering that non-stationary variables may lead to a spurious regression (Granger and Newbold, 1974). The null hypothesis (H_0) of the regression was tested to have a unit root against the alternative of stationarity by applying the following term:

$$\Delta \Lambda_t = z_0 + z_1 t + z_2 \Lambda_{t-1} + \sum_{i=1}^n j_i (\Delta \Lambda_{t-i+1}) + \varepsilon_t \quad (20)$$

where Δ is the first difference operator with n lags, z is the t -statistic coefficient, and ε_t stands for the random error of autocorrelation. The null hypothesis signifies that Λ_t is a non-stationary series and rejected when z_2 is significant and of a negative sign ($H_0 : z_2 = 0; H_1 : z_2 < 0$). Finally, the lags of optimal number (n) are chosen from the rule of Akaike (AIC) or Schwarz (SIC) information criterion.

4.2 ARDL bounds testing approach

After testing the stationarity of the time series, we applied the ARDL bounds testing approach proposed by Pesaran and Shin (1999, 2001) to investigate the long-term relations between variables. Eqs. (19a) and (19b) can be rewritten as the error correction model of ARDL formation as follows:

$$\Delta(Y)_t = \pi_0 + \sum_{i=1}^m \pi_{1i} \Delta(Y)_{t-i} + \sum_{i=0}^m \pi_{2i} \Delta(PS)_{t-i} + \sum_{i=0}^m \pi_{3i} \Delta(ME)_{t-i} + \pi_4(Y)_{t-1} + \pi_5(PS)_{t-1} + \pi_6(ME)_{t-1} + \varepsilon_{1t} \quad (21a)$$

$$\Delta(SW)_t = \pi_1 + \sum_{j=1}^n \pi_{1j} \Delta(SW)_{t-j} + \sum_{j=0}^n \pi_{2j} \Delta(PS)_{t-j} + \sum_{j=0}^n \pi_{3j} \Delta(ME)_{t-j} + \pi_7(SW)_{t-1} + \pi_8(PS)_{t-1} + \pi_9(ME)_{t-1} + \varepsilon_{2t} \quad (21b)$$

In Eqs. (21a) and (21b), the null hypothesis is detected by testing the F -statistic for $\{H_0: \pi_4 = \pi_5 = \pi_6 = \pi_7 = \pi_8 = \pi_9 = 0\}$ against the alternative $\{H_1: \pi_4 \neq \pi_5 \neq \pi_6 \neq \pi_7 \neq \pi_8 \neq \pi_9 \neq 0\}$ to determine the existence of cointegration between variables. Pesaran et al. (2001) offered a bounds test for two sets of critical variables: one set assumes that all variables are $I(0)$, and the other set assumes that all variables are $I(1)$. If the tested F -statistic is less than the lower bound critical value $I(0)$, then the null hypothesis of no cointegration cannot be rejected; on the contrary, if the tested F -statistic is greater than the upper bound critical value $I(1)$, then the null hypothesis will be rejected. Furthermore, if the tested F -statistic lies between $I(0)$ and $I(1)$, then the inference is indecision regarding the co-integration. We referred to the critical values $I(0)$ and $I(1)$ suggested by Narayan (2005), which are more applicable than those of small sample sizes. Residuals must have no correlation in the ARDL bounds test model. Thus, if cointegration exists between variables, the long-term ARDL equations can be estimated via Eqs. (22a) and (22b), respectively.

$$Y_t = \pi_0 + \sum_{i=1}^c \pi_{1i} Y_{t-i} + \sum_{i=0}^d \pi_{2i} PS_{t-i} + \sum_{i=0}^e \pi_{3i} (ME)_{t-i} + \varepsilon_{1t} \quad (22a)$$

$$(SW)_t = \pi_1 + \sum_{j=1}^f \pi_{1j} (SW)_{t-j} + \sum_{j=0}^g \pi_{2j} PS_{t-j} + \sum_{j=0}^h \pi_{3j} (ME)_{t-j} + \varepsilon_{2t} \quad (22b)$$

The best estimated ARDL model in Eqs. (22a) and (22b) is determined when the lag values c, d, e and f, g, h have attained their minimum AIC or SIC.

5. Empirical Results

5.1 Results of unit root tests

Although the ARDL bounds approach allows the estimation of cointegration with $I(0)$ or $I(1)$, using the ADF unit root test to confirm their stationarity is an essential process to guarantee that all variables' integration order does not exceed one. Table 1 presents the ADF unit root test results for the level term and confirms stationarity after the first difference. Thus, the ARDL bounds approach can be employed to estimate long-term relations.

Table 1 ADF unit root test results

Variables	Level Term	First Difference
<i>Y</i>	-2.14(4)	-8.06(0)***
<i>SW</i>	-2.98(3)	-7.94(0)***
<i>PS</i>	-1.29(3)	-6.43(1)***
<i>ME</i>	-3.01(5)	-7.11(0)***

Note: (a) *** and ** indicate the null is rejected at the 5% and 1% significance levels, respectively. (b) Numbers in parentheses are the optimal lag orders and selected based on the AIC information criterion.

5.2 Results of ARDL cointegration tests

The ARDL bounds testing results reveal the long-term relations between the variables. Table 2 provides the *AIC*, *SIC*, and *F-statistic* for $\{H_0: \pi_4 = \pi_5 = \pi_6 = \pi_7 = \pi_8 = \pi_9 = 0\}$. The optimal lag number of n in Eqs. (21a) and (21b) is selected as 5 and 6, respectively. The cointegration results of long-term estimates are shown in Table 3.

Table 2 ARDL bounds test results for co-integration

	Lag (<i>n</i>)	<i>AIC</i>	<i>SIC</i>	<i>F</i> -statistic
Dependent Variable: <i>Y</i>	<i>n</i> =1	-2.163	-1.682	4.93
	2	-2.024	-1.401	3.38
	3	-2.101	-1.131	2.650
	4	-3.027	-1.717	5.646*
	5	-2.990	-1.488	0.979
Dependent Variable: <i>SW</i>	<i>n</i> =1	-2.113	-1.615	4.603
	2	-1.986	-1.319	2.791
	3	-2.071	-1.228	2.877
	4	-2.051	-1.058	2.112
	5	-3.078	-1.719	5.688**
	6	-2.958	-1.418	0.779

Note: (a) **, and * indicate the null is rejected at the 5%, and 10% significance levels, respectively. (b) Asymptotic critical values are obtained based on Pesaran et al. (2001) and from the table CaseIII by Narayan (2005).

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Table 3 Co-integration of long run estimates:

Model	Variables	Coefficient	St. Error	T-ratio	Prob.
Model 1 : Dependent Variable is Y	PS	0.058	0.84E-3	18.33	0.00**
	ME	-0.018	0.024	-1.79	0.08*
	Intercept	-2.125	0.285	-9.23	0.00**
Model 2 : Dependent Variable is SW	PS	-0.166	0.35E-8	-1.88	0.07*
	ME	-0.056	0.133	-4.52	0.08**
	Intercept	-3.885	0.143	-11.23	0.00**

Note: ** and * indicate the null is rejected at the 5% and 1% significance levels, respectively.

Most of the coefficients in models 1 and 2 were negatively significant except for the coefficient of the variable PS in model 1, with Y as the dependent variable. In model 1, the sign of the coefficient for the variable PS (ME) is positive (negative), indicating that raising public spending (military expenditure) will lead to economic growth (recession). In other words, this empirical result supports our Proposition 1 but contradicts the Benoit hypothesis (Benoit, 1978). In model 2, the coefficient sign of the variables PS and ME are negative, which indicates that an increase in public spending and military expenditure will decrease social welfare. However, no empirical evidence supports proposition 2 on the positive relation between military expenditure and social welfare. The theoretical and empirical results are summarized in Table 4.

Table 4 Overview the theoretical and empirical evidence

Government Expenditure	Proposition 1	Proposition 2	Empirical Evidence	
	Y	SW	Y	SW
Public Spending(ω)	↑	↓	↑	↓
Military Expenditure($1-\omega$)	↓	↑	↓	↓

6. Conclusion

The debate on whether military expenditure promotes economic performance and social welfare has gone on for decades. The efficiency of a government's spending allocation to achieve economic growth or welfare has also drawn much attention in recent studies. Our study aimed to contribute to this line of research using theoretical and empirical mechanisms to evaluate the guns-and-butter debate. We adopted an endogenous growth model and divided government spending into military expenditure and public spending to examine the purported benefits of both economic growth and social welfare. Propositions in the theoretical model

proved the existence of a trade-off between economic growth and social welfare. In other words, an increase in military expenditure will impede economic growth but benefit social welfare.

Former empirical studies on the relation among military expenditure, economic growth, and social welfare have tended to apply single regression modelling or cross-section data analysis while ignoring the implicit endogenous problem. In the empirical part of our study, we used ARDL bounds testing results to explore the variables' endogeneity in regressions, and henceforth avoided the hetero-homogeneous problem. The empirical cointegration results suggested that an increase in the ratio of military expenditure would lead to lower economic growth and social welfare in the long run. This empirical result is consistent with our theoretical evidence in proposition 1 but contradicts that in proposition 2. The famous Benoit hypothesis is not evidenced in our theoretical and empirical results: an expansion of military expenditure weakens economic growth and welfare.

Our study has some useful implications. First, the evidence that contradicts the Benoit hypothesis may explain the attention on arms race (guns) and disarmament (butter) issues in recent decades and in view of economic performance. Our findings also provide empirical reference for policy makers towards effective government allocation and spending. Second, from a methodological perspective, the endogenous model within the theoretical and empirical approach of our research can be expected to have a more generalized multivariate application, where economic growth, social welfare, and military expenditure are explicitly influenced by other economic factors, such as human capital, income inequality, national fundamental wealth, and other non-economic factors (e.g. military threats, political landscape, geographical distribution). Future research may consider these aspects and other economic ones from the abovementioned perspectives.

REFERENCES

- [1] Ali, H. E. (2012), *Military Expenditures and Inequality in the Middle East and North Africa: A Panel Analysis*. *Defence and Peace Economics*, 23: 575-589;
- [2] Azam, M., Khan, F., Zaman, K., Rasli, A. M. (2015), *Military Expenditures and Unemployment Nexus for Selected South Asian Countries*. *Social Indicators Research*, 127: 203-213;
- [3] Barro, R. Jr., Sala I. M. (1995), *Economic Growth*. McGraw-Hill, New York;
- [4] Benoit, E. (1978), *Growth and Defense in Developing Countries*. *Economic Development and Cultural Change*, 26: 271-280;
- [5] Deger, S. (1985), *Human Resource, Government's Education Expenditure and the Military Burden in Less Developed Countries*. *Journal of Developing Areas*, 20: 37-48;
- [6] Dickey, D. A., Fuller, W. A. (1979), *Distribution of the Estimators for Autoregressive Time Series with a Unit Root*. *Journal of American Statistical Association*, 74: 427-431;
- [7] Domke, W. K., Eichenberg, R. C., Kelleher, C. M. (1983), *The Illusion of Choice: Defence and Welfare in Advanced Industrial Democracies 1948-1978*. *American Political Science Review*, 77:19-35;
- [8] Futagami, K., Morita, Y., Shibita, A. (1993), *Dynamic Analysis of an Endogenous Growth Model with Public Capital*. *Scandinavian Journal of Economics* 95:607-625;
- [9] Granger, C. W. J., Newbold, P. (1974), *Spurious Regressions in Econometrics*. *Journal of Econometrics*, 2: 111-120;
- [10] Greiner, M., Hanusch, H. (1998), *Growth and Welfare Effects of Fiscal Policy in an Endogenous Growth Model with Public Investment*. *International Tax and Public Finance*, 5: 249-261;
- [11] Harris, G., Pranowo, M. K. (1988), *Trade-Offs between Defence and Education Health Expenditures in Developing Countries*. *Journal of Peace Research*, 25:165-177;
- [12] Kollias, C., Paleologou, S.M. (2011), *Budgetary Trade-Offs Between Defense, Education and Social Spending in Greece*. *Applied Economics Letters*, 18:1071-1075;
- [13] Lin, E. S., Ali, H. E., Lu, Y. L. (2015), *Does Military Spending Crowd out Social Welfare Expenditures? Evidence from a Panel of OECD Countries*. *Defense and Peace Economics*, 26: 33-48;
- [14] Lindgren, G. (1984), *Armaments and Economic Performance in Industrialized Market Economies*. *Journal of Peace Research*, 21:375-387;
- [15] Lin, H.P., Wang, T.L., Yang, C.L. (2016), *Further Causality Evidence on Arms Race, Inflation, and Economic Growth*. *Economic Computation and Economic Cybernetics Studies and Research*, 50:123-137; ASE Publishing;

- [16] Malizard, J. (2014), *Defense Spending and Unemployment in France*. *Defense and Peace Economics*, 25: 635-642;
- [17] Narayan, P. K. (2005), *The Saving and Investment Nexus for China: Evidence from Co-Integration Tests*. *Applied Economics*, 37: 1979-1990;
- [18] Ozsoy, O. (2002), *Budgetary Trade-offs Between Defence, Education and Health Expenditures: The Case of Turkey*. *Defense and Peace Economics*, 13: 129-136;
- [19] Peroff, K. K., Podolak-Warren, M. (1979), *Does Spending on Defence Cut Spending on Health? A Time-Series Analysis of the U.S. Economy 1929-74*. *British Journal of Political Science*, 9:21-40;
- [20] Pesaran, H. M., Shin, Y. (1999), *An Autoregressive Distributed Lag Modeling Approach to Co-integration Analysis*. In: Strom, S. (Ed.), *econometrics and economic theory in the 20th century: the ragnar frisch centennial symposium*. Cambridge University Press, Cambridge;
- [21] Pesaran, H. M., Shin, Y., Smith, R. J. (2001), *Bounds Testing Approaches to the Analysis of Level Relationships*. *Journal of Applied Econometrics*, 16: 289-326;
- [22] *Defense Economics*, edited by K. Hartley and T. Sandler. Amsterdam: North Holland: 251-271;
- [23] Russett, B.M. (1969), *Who Pays for Defence?* *American Political Science Review*, 63(2) 412-426;
- [24] Scheetz, T. (1992), *The Evolution of Public Sector Expenditures: Changing Political Priorities in Argentina, Chile, Paraguay and Peru*. *Journal of Peace Research*, 29:175-190;
- [25] Tiwari, A., Shahbaz, M. (2011), *Does Defense Spending Stimulate Economic Growth in India? A Revisit*. *Defense and Peace Economics*, 24: 371-395;
- [26] Turnovsky, S. (2000b), *Fiscal Policy, Elastic Labor Supply, and Endogenous Growth*. *Journal of Monetary Economics*, 45: 185-210;
- [27] Verner, J.G. (1983), *Budgetary Trade-offs between Education and Defence in Latin American: A research note*. *Journal of Developing Areas*, 18: 25-32;
- [28] Yildirim, J., Sezgin, S. (2002), *Defence, Education and Health Expenditures in Turkey 1924 -96*. *Journal of Peace Research*, 39: 569-580.