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Does Taiwan's Defense Spending Crowd out Education and Social Welfare Expenditures?

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This study utilizes an asymmetric Granger causality test to investigate the causal effect between defense spending and social welfare and education expenditures in Taiwan over the period 1962-2017. The main findings herein do not support that defense spending crowds out social welfare and education expenditures. On the contrary, a positive defense spending shock causes a positive shock to social welfare expenditures. More specifically, increases in defense spending appear to lead to increases in social welfare expenditures. One of the explanations behind this relationship may be that a rise in Taiwan's defense spending is helpful for both political and economic stability, which in turn promotes economic growth and further escalates social welfare expenditures.

Keywords: asymmetric granger causality test, crowding-out effect, defense spending, education expenditures, social welfare expenditures

JEL classification: C32, C52, H52, H53

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1 Introduction

National security is the foundation of a country's competition and economic development. Before 1989, defense spending was the largest share of Taiwanese government expenditures, as national security was primary goal, and the Taiwan government put forth great efforts and spent a lot of money on it. After the lifting of Martial Law was proclaimed in 1987, Taiwan has gradually moved toward democratic liberalization, and its national security policy has turned to tenacious defense. Since 1989, defense spending has been less than education expenditures, and from 1991 onwards it has been less than social welfare expenditures (as shown in Figure 1). In fact, ever since the implementation of the National Health Insurance system in 1995, Taiwan's social welfare spending has been greater than education expenditures, taking up the largest share of government expenditures.

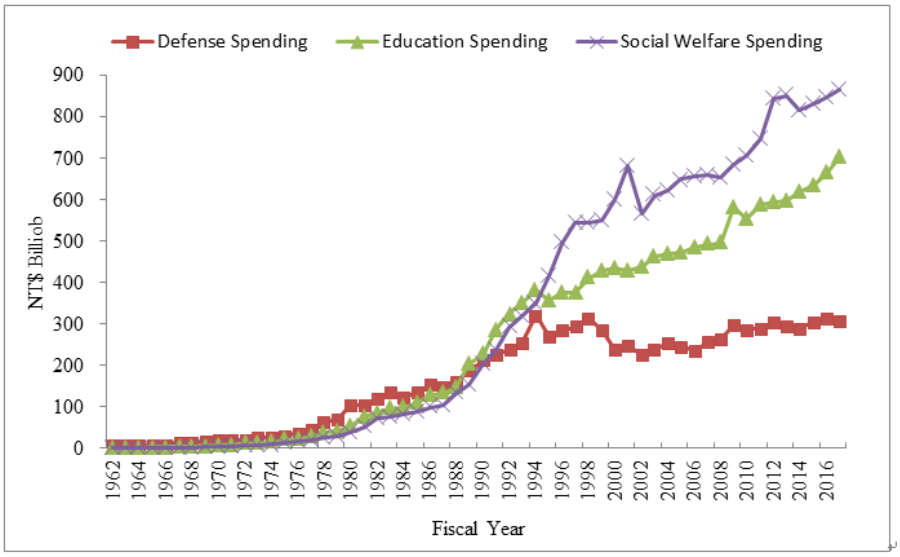

Figure 1. Defense Spending, Social Welfare, and Education Expenditures

Taiwan's long-held perception of an existential military threat from China began to abate in the late 1980s, especially after 1987, when the Taiwan government approved home visits for retired soldiers, allowing veterans to return to their birthplaces in China for the first time in nearly 40 years. Taiwan's defense spending declined from 9% of GDP in 1962 to 4.74% GDP in 1994. Following the 1995-96 Taiwan Strait Missile Crisis, defense spending between 1995 and 1999 averaged roughly NT$267 billion per year, accounting for about 3.4% of GDP. During the two terms of President Chen Shui-bian's administration (2000-2008), Taiwan's annual defense spending fell to 2% of GDP per year, averaging around NT$245 billion. Over the past six years of the President Ma, Ying-jeou administration (2008-2016), Taiwan's defense spending has consistently declined from 2.30% GDP in 2016 to 1.84% GDP in 2016.

When the DPP's Tsai Ing-wen was elected president of Taiwan in 2016, China's military deterrent to Taiwan gradually intensified. In 2017, China compiled a national defense budget of 114.797 billion RMB, or about US$157.3 billion, second only to the United States in aggregate amount.

President Tsai Ing-wen pushed forward the National Defense Independence Policy in 2017, with plans to increase the national defense budget year by year, hoping to reach 3% of GDP for the purpose of improving military research and development and safeguarding Taiwan's military security from China's military threat. She also said that if there are any important weapons that need to be procured, then they can be handled through a special budget without being subject to the current budget.

Does defense spending crowd out other major government expenditures, specifically social welfare and education expenditures? The purpose of this study is to investigate the causal relationship between defense spending and social welfare and education expenditures.

The remaining part of this paper is organized as follows. Section 2 provides a literature review regarding the trade-off between defense spending and social welfare expenditures (or education expenditures). Section 3 describes the datasets and demonstrates the econometric methodology for the study's empirical analysis. Section 4 presents the empirical results. Section 5 provides the conclusions.

2 Literature Review

Numerous studies have investigated the trade-off between defense spending and other major government expenditures, noting that an increase in defense spending may result in the crowding-out effect on other government expenditures such as for social welfare and education. Because defense spending may be harmful for investment, personal consumption, and human capital formation and thus lower economic growth and further reduce social welfare expenditures, some studies support the negative trade-off between defense spending and social welfare or education expenditures. For example, Rusett (1966) finds a crowding-out effect between defense spending and health and education expenditures in France, the UK, and the U.S. during the period 1939-1968. Peroff and Podolak-Warren (1979) report a negative trade-off effect between defense spending and health expenditures in the U.S. for the period 1929-1974. Deger (1985) shows that there is a trade-off effect between defense spending and social welfare expenditure in 50 less developed countries over the period 1967-1973. Yildirim and Sezgin (2002) suggest a negative trade-off effect between defense spending and social welfare in Turkey during the period 1924-1996. Ali (2011) presents that military spending crowds out spending on health in Egypt in the period 1987-2005.

Some studies contrarily argue that defense spending may have a positive effect on investment, human capital formation, economic growth, and social welfare expenditures. For example, Yildirim and Sezgin (2002) suggest a positive trade-off effect between defense spending and education expenditures in Turkey over the period 1924-1996. Ali (2011) shows that military spending crowds in spending on education in Egypt for the period 1987-2005. Kollias and Paleologou (2011) find a positive trade-off between defense spending and welfare expenditure in Greece over the period 1974-2004. Lin *et al*. (2015) show a positive trade-off between military spending and education and welfare expenditures in 29 OECD countries during the period 1988-2005.

Some empirical studies additionally support no trade-off relationship between defense spending and social welfare expenditures. For example, Caputo (1975) finds no defense-welfare trade-off in Australia, Sweden, the UK, and the U.S. during the

period 1950-1970. Russett (1982) and Mintz (1989) show no trade-off effect between defense spending and social welfare expenditures in the U.S. for the period 1941-1971 and for the period 1947-80, respectively. Domke *et al*. (1983) suggest no defense-welfare trade-off in Germany, France, the UK, and the U.S. during the period 1948-1980. Eichenberg (1984) presents no defense-welfare trade-off in Germany in the period 1950-1979. Hess and Mullan (1988) report no defense-welfare trade-off in 77 less-developed countries over the period 1967-1982. Davis and Chan (1990) state there is no defense-welfare trade-off in Taiwan over the period 1961-1985. Frederiksen and Looney (1994) suggest no trade-off effect between defense spending and social welfare expenditures in Pakistan during the period 1973-1986.

Eryigit *et al.* (2012) show that education and health expenditures have positive impacts on economic growth positively in Turkey, but defense expenditures have negative effects. In addition, the results show that there is a budgetary trade-off between education–health and defense expenditures. T*öngür et al*. (2015) investigate the relationship between type of welfare regimes and military expenditures, with findings showing that there is a positive relationship between income inequality and share of military expenditures in the central government budget, and that there is a significantly negative relationship between social democratic welfare regimes and military expenditures.

Zhang *et al.*'s (2017) empirical results show that military spending enhances social welfare expenditures in developed countries, while the effect is ambiguous in emerging economies. Further comparative analyses indicate that unlike the results for the G7, the effect of military spending growth on growth in social welfare expenditures is negative and shorter in the BRICS. Xu *et al.* (2017) identify a negative unidirectional causality running from education expenditure to defense spending. Their finding suggests that it is education expenditure that crowds out defense spending in China rather than the reverse.

To sum up, a large number of empirical studies has attempted to explore the relationship between defense spending and social welfare expenditures or education expenditures, but there is no consensus on their empirical findings. The empirical studies mentioned above adopt linear models and ignore the possibility of an asymmetric process. Therefore, our study takes into account this issue and utilizes

the asymmetric causality test to investigate the warfare-welfare trade-off in Taiwan.

3 Data and Econometric Methodology

3.1 Data

This study investigates the trade-off relationship between defense spending and social welfare and education expenditures during the period 1962-2014. The dataset used herein consists of annual observations of defense spending (*DEF*), social welfare expenditures (*SW*), and education expenditures (*EDU)*. Social welfare expenditures include social insurance, social relief, welfare service, employment service, public health, and retirement and condolence. Education expenditures consist of expenditures for education, science, and culture. All data are obtained from AREMOS Taiwan Government Finance and Tax Statistical Databank.

Table 1 provides the summary statistics of defense spending, social welfare spending, and education spending. The results show that, among Taiwan's defense, social welfare, and education expenditures, the greatest and lowest are social welfare expenditure and defense spending in the amount of NT$290.18 billion and NT$160.02 billion, respectively. The Jarque-Bera test results indicate that these three government expenditures data series are not normal at the 10% level of significance.

3.2 Asymmetric Granger Causality Test

Concerning the trade-off relationship between defense spending and the other government expenditures, previous literature ignores the possibility of an asymmetric process and assumes that the impact of a positive shock is the same as that of a negative shock in absolute terms. However, positive and negative shocks may have different causal impacts. Therefore, our study takes into account this issue and utilizes the asymmetric causality test, as suggested by Hatemi-J (2012), which allows for the separation between the causal impacts of positive and negative shocks.

Table 1. Summary Statistics of Defense, Social Welfare, and Education Expenditures

	DEF	*SW*	*EDU*
Mean	167.782	319.838	261.120
Median	199.441	178.638	216.136
Maximum	321.821	867.221	704.252
Minimum	7.048	1.117	2.196
Std. Dev.	114.303	316.501	232.917
Skewness	-0.215	0.406	0.289
Kurtosis	1.440	1.532	1.573
Jarque-Bera	6.107**	6.571**	5.528*

Notes: The sample period is from 1962 to 2017.
** and * denote significance at the 5% and 10% levels, respectively.

This study focuses on the causal relationship between defense spending (*DEF*) and other major government expenditures (*EXP*), or more specifically social expenditures (*SW*) and education expenditures (*EDU*). Given two integrated variables EXP_t and DEF_t, we define them as a random walk process as follows:

$$EXP_t = EXP_{t-1} + \varepsilon_{1t} = EXP_0 + \sum_{i=1}^{t} \varepsilon_{1i} , \quad (1)$$

and

$$DEF_t = DEF_{t-1} + \varepsilon_{2t} = DEF_0 + \sum_{i=1}^{t} \varepsilon_{2i} , \quad (2)$$

where the constants EXP_0 and DEF_0 are the initial values, and the variables ε_{1t} and ε_{2t} are i.i.d with variances $\sigma^2_{\varepsilon_1}$ and $\sigma^2_{\varepsilon_2}$, respectively. We indicate cumulative positive sums of positive and negative shocks by + and – signs, while defining positive and negative shocks as the following: $\varepsilon^+_{1t} = \max(\varepsilon_{1i}, 0)$, $\varepsilon^+_{2t} = \max(\varepsilon_{2i}, 0)$, $\varepsilon^-_{1t} = \min(\varepsilon_{1i}, 0)$, and $\varepsilon^-_{2t} = \min(\varepsilon_{2i}, 0)$, respectively. Thus, we can express $\varepsilon_{1t} = \varepsilon^+_{1t} + \varepsilon^-_{1t}$ and $\varepsilon_{2t} = \varepsilon^+_{2t} + \varepsilon^-_{2t}$.

We now rewrite equations (1) and (2) as:

$$EXP_t = EXP_{t-1} + \varepsilon_{1t} = EXP_0 + \sum_{i=1}^{t} \varepsilon_{1i}^{+} + \sum_{i=1}^{t} \varepsilon_{1i}^{-}, \quad (3)$$

and

$$DEF_t = DEF_{t-1} + \varepsilon_{2t} = DEF_0 + \sum_{i=1}^{t} \varepsilon_{2i}^{+} + \sum_{i=1}^{t} \varepsilon_{2i}^{-}. \quad (4)$$

We further define the positive and negative shocks of each variable in cumulative form as $EXP_t^{+} = \sum_{i=1}^{t} \varepsilon_{1i}^{+}$, $EXP_t^{-} = \sum_{i=1}^{t} \varepsilon_{1i}^{-}$, $DEF_t^{+} = \sum_{i=1}^{t} \varepsilon_{2i}^{+}$, and $DEF_t^{-} = \sum_{i=1}^{t} \varepsilon_{2i}^{-}$. Each positive and negative shock has a permanent impact on the underlying variable. To test the causal relationship between these two components, Hatemi-J (2012) and Hatemi-J and Uddin (2012) develop a single test statistic in the time domain, assuming that it holds for all points in the frequency distribution. There are four combinations of positive and negative shocks ((EXP_t^{+}, DEF_t^{+}), (EXP_t^{+}, DEF_t^{-}), (EXP_t^{-}, DEF_t^{+}), (EXP_t^{-}, DEF_t^{-})) as Hatemi-J and Uddin (2012) suggest.

We now conduct the test for asymmetric causality by using a vector autoregressive (VAR) model with optimal lag length (*p*) as follows:

$$Y_t^c = A + B_1 Y_{t-1}^c + B_{12} Y_{t-2}^c + \cdots + B_p Y_{t-p}^c + \nu_t^c, \quad (5)$$

where $Y_t^c = (EXP_t^c, DEF_t^c)$, A is the vector of intercepts, B_i is the matrix of parameters, *c* is the type of component (i.e. positive "+" or negative "–"), and ν is the vector of error terms. We select the optimal lag length *p* by the following information criterion, which is suggested by Hatemi-J (2003):

$$HJC = \ln\left(\left|\widehat{\Omega}\right|\right) + j\left(\frac{n^2 lnT + 2n^2 \ln(lnT)}{2T}\right) \quad j = 0, 1, \cdots, p, \quad (6)$$

where $\left|\hat{\Omega}_j\right|$ is the determinant of the estimated variance-covariance matrix of the error terms in the VAR model based on the lag length *j*, *n* is the number of equations in the VAR, and *T* is the total number of observations.

We then use a Wald test to look for Granger causality via the VAR(*p*) model defined as follows:

$$Y = DZ + \delta, \tag{7}$$

where

$Y = (Y_1^c, \cdots, Y_T^c)$ $(n \times T)$ matrix;

$D = (A, B_1, \cdots, B_p)$ $(n \times (1 + np))$ matrix;

$Z_t = \begin{bmatrix} 1 \\ Y_t^c \\ Y_{t-1}^c \\ \vdots \\ Y_{t-p+1}^c \end{bmatrix}$ $((1 + np) \times 1)$ matrix for $t = 1, \cdots, T$;

$Z = (Z_0, \cdots, Z_{T-1})$ $((1 + np) \times T)$ matrix;

$\delta = (v_1^c, \cdots, v_T^c)$ $(n \times T)$ matrix.

We test the null hypothesis of no Granger causality, $H_0 : R\beta = 0$, by the following:

$$Wald = (R\beta)'[R((Z'Z)^{-1} \otimes S)R']^{-1}(R\beta), \tag{8}$$

where R is an indicator matrix of the parameters with elements consisting of ones for restricted parameters and zeros for the rest of the parameters, β is the column stack of D, $\otimes$ represents the Kronecker product, and S is the variance–covariance matrix of the unrestricted model. As Hatemi-J and Uddin (2012) note, autoregressive conditional heteroskedasticity (ARCH) effects in financial data do not usually follow a normal distribution, and hence there is the possibility that the distribution of the Wald statistic substantially deviates from its asymptotic distribution. Therefore, we utilize the bootstrapping simulation technique based on Hatemi-J and Uddin (2012) for 10,000 iterations to construct the 10%, 5%, and 1% critical values by using GAUSS software.

4 Empirical Results

Before proceeding to asymmetric Granger causality between defense spending and social welfare expenditures (or education expenditures), it is necessary to determine the integration degree of variables by using the unit root tests. This study thus conducts the Augmented Dichey-Fuller (ADF) and Phillips-Perron (PP) unit root tests, with the results in Table 2. An important aspect of unit root estimation in the

presence of a structural break is the trend property of the variables. Therefore, we also adopt the Zivot and Andrews unit root test with a breakpoint. Table 3 reports the results of this test.

According to the results of the ADF test and PP test in Table 2, the null hypothesis of a unit root for all variables in levels cannot be rejected at the 1% level of significance. The results of the Zivot and Andrews unit root test in Table 3 suggest that we cannot reject the null of unit root for *DEF*, *SW*, and *EDU* at the 1% significance level. These imply that all variable are non-stationary with or without a structural break. Additionally, for all variables in first differences in Table 2, the null hypothesis of a unit root can be rejected at the 1% level of significance. Hence, all variables are integrated of one order.

Table 2. Results of Unit Root Tests

Variable	ADF		PP	
	Level	1st Differences	Level	1st Differences
DEF	-0.792	-8.437***	-0.762	-8.389***
DEF^+	0.129	-8.012***	1.959	-7.986***
DEF^-	0.516	-7.211***	0.527	-7.211***
SW	1.094	-6.840***	1.078	-6.840***
SW^+	-0.395	-8.242***	0.065	-8.828***
SW^-	0.731	-6.793***	0.730	-6.792***
EDU	1.811	-7.352***	1.657	-7.483***
EDU^+	-0.238	-7.258***	-0.289	-7.257***
EDU^-	-1.847	-7.014***	-1.850	-7.014***

Note: *** denotes significance at the 1% levels, respectively.

Table 3. Results of the Zivot and Andrews Unit Root Test

Variable	t-statistics	Break year
DEF	-3.764	2000
SW	-3.036	1990
EDU	-4.300	1989

Note: The critical values for the Zivot and Andrews test are -5.57, -5.08, and -4.82 at the 1%, 5%, and 10% levels of significance, respectively.

This study adopts Toda and Yamamto (1995)'s VAR(p+d) model, where p is the optimal lag order and d is the maximum order of integration. In this study, d is equal to 1. At the same time, the optimal lag order (p) in the VAR model is equal to 1, as determined by the HJC information criterion.

Table 4 lists the test results of Granger causality between defense spending and social welfare expenditure. For comparison purpose, we report both symmetric and asymmetric Granger causality test results. As shown in Table 4, there is no Granger causality between defense spending and social welfare expenditures in terms of symmetric form. As for the asymmetric causality test results, only the null hypothesis that positive defense spending shocks do not Granger cause positive shocks in social welfare expenditures (i.e. $DEF^{+} \not\Rightarrow SW^{+}$) can be rejected at the 10% significance level, but the null hypothesis of no Granger causality cannot be rejected for the other seven cases: $DEF^{-} \not\Rightarrow SW^{-}$, $DEF^{-} \not\Rightarrow SW^{+}$, $DEF^{+} \not\Rightarrow SW^{-}$, $SW^{+} \not\Rightarrow DEF^{+}$, $SW^{-} \not\Rightarrow DEF^{-}$, $SW^{-} \not\Rightarrow DEF^{+}$, and $SW^{+} \not\Rightarrow DEF^{-}$. The result indicates that a positive shock from defense spending will further increase social welfare expenditures. Therefore, defense spending does not crowd out social welfare expenditures.

Table 4. Granger Causality between Defense and Social Welfare Expenditures

Null Hypothesis	Test Statistics	Bootstrap		
		CV at 1%	CV at 5%	CV at 10%
$DEF \not\Rightarrow SW$	0.801	8.173	4.534	3.099
$DEF^{+} \not\Rightarrow SW^{+}$	3.504*	7.377	4.301	3.278
$DEF^{-} \not\Rightarrow SW^{-}$	0.731	13.586	5.814	3.007
$DEF^{-} \not\Rightarrow SW^{+}$	1.579	9.079	4.062	2.760
$DEF^{+} \not\Rightarrow SW^{-}$	0.132	9.616	4.151	2.803
$SW \not\Rightarrow DEF$	1.308	7.698	4.305	2.942
$SW^{+} \not\Rightarrow DEF^{+}$	1.624	8.739	4.204	3.023
$SW^{-} \not\Rightarrow DEF^{-}$	0.766	16.706	6.303	2.821
$SW^{-} \not\Rightarrow DEF^{+}$	0.426	10.021	4.919	3.015
$SW^{+} \not\Rightarrow DEF^{-}$	0.055	8.862	4.631	3.107

Notes: Here, X $\not\Rightarrow$ Y means that the variable X does not Granger cause variable Y.
CV indicates the critical value.
* denotes significance at the 10% level.

Table 5 reports the Granger causality test results between defense spending and education expenditures. It is evident that there is no symmetric Granger causality between the two. According to the asymmetric causality test results, only the null hypothesis that negative defense spending shocks do not Granger cause positive shocks in defense spending (i.e. $EDU^{-} \not\Rightarrow DEF^{+}$) can be rejected at the 5% significance level, but the null hypothesis of no Granger causality cannot be rejected for the other seven cases: $DEF^{+} \not\Rightarrow EDU^{+}$, $DEF^{-} \not\Rightarrow EDU^{-}$, $DEF^{-} \not\Rightarrow EDU^{+}$, $DEF^{+} \not\Rightarrow EDU^{-}$, $SW^{-} \not\Rightarrow DEF^{-}$, $SW^{-} \not\Rightarrow DEF^{+}$, and $SW^{+} \not\Rightarrow DEF^{-}$. This result indicates that a negative shock from education expenditures will further increase defense spending. Therefore, there is no evidence to support that defense spending crowds out education expenditures.

Table 5. Granger Causality between Defense and Education Expenditures

Null Hypothesis	Test Statistics	Bootstrap		
		CV at 1%	CV at 5%	CV at 10%
$DEF \not\Rightarrow EDU$	1.579	8.139	4.471	3.075
$DEF^{+} \not\Rightarrow EDU^{+}$	0.700	8.285	4.456	3.014
$DEF^{-} \not\Rightarrow EDU^{-}$	0.043	15.033	4.555	2.295
$DEF^{-} \not\Rightarrow EDU^{+}$	0.719	7.849	4.293	2.868
$DEF^{+} \not\Rightarrow EDU^{-}$	1.582	8.107	4.035	2.807
$EDU \not\Rightarrow DEF$	0.681	7.652	4.332	2.995
$EDU^{+} \not\Rightarrow DEF^{+}$	0.918	7.450	4.123	2.874
$EDU^{-} \not\Rightarrow DEF^{-}$	0.765	18.691	5.510	2.387
$EDU^{-} \not\Rightarrow DEF^{+}$	4.637**	9.587	4.382	2.861
$EDU^{+} \not\Rightarrow DEF^{-}$	0.812	9.150	4.246	2.734

Notes: Here, X $\not\Rightarrow$ Y means that variable X does not Granger cause variableY.
CV indicates the critical value.
** denotes significance at the 5% level.

5 Conclusions

The traditional symmetric Granger causality test assumes that the impact of a positive shock is the same as that of a negative shock in absolute terms. However, positive and negative shocks may have different causal impacts. Therefore, the present study takes into account this issue and utilizes an asymmetric Granger causality test as suggested by Hatemi-J (2012) to examine the causal relationship between Taiwan's defense spending and social welfare and education expenditures over the period 1962-2017.

Empirical results from the traditional symmetric Granger causality test show that there is neither Granger causality between defense spending and social welfare expenditures nor Granger causality between defense spending and education

expenditures. However, the test results from an asymmetric causality test suggest that a positive defense spending shock will cause a positive shock in social welfare expenditures. More specifically, defense spending increases lead to social welfare expenditure increases. Additionally, a negative education spending shock will cause a positive shock in defense spending. The result indicates that if education expenditures decrease, then defense spending will increase.

Neither the symmetric Granger causality test results nor the asymmetric Granger causality test results show that an increase in defense spending causes a decrease in social welfare and education expenditures. Therefore, there is no evidence to support that Taiwan's defense spending crowds out social welfare and education expenditures. In addition, defense spending increases will cause social welfare expenditures to increase. One of the reasons for this relationship may be that an increase in Taiwan's defense spending is helpful for lifting political and economic stability, which is conductive to economic growth and further raises social welfare expenditures. The findings of this study indicate that budget policy makers in Taiwan could raise defense expenditures in order to cause increases in social welfare expenditures. Although Cross-Strait relations may have stabilized in recent years, Taiwan has always faced an existential military threat from China. Over the past years under President Ma Ying-Jeou's administration, Taiwan's defense budget has consistently declined. The trend of Taiwan's shrinking military budget might limit the country's ability to support military research and development. Therefore, any increases to defense spending will not only serve the purpose of improving and safeguarding Taiwan's military security from China's military threat, but also support economic growth and social welfare.

In conclusion, an increase in defense spending does not necessarily lead to a sacrifice in social welfare or education expenditures. The findings of this study provide important implications for budget policy makers in Taiwan. For instance, some politicians' suggestion to cut defense spending as a means to increase social welfare or education expenditures may not be effective or appropriate for Taiwan.

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References

Ali, H. E., (2011), "Military Expenditures and Human Development: Guns and Butter Arguments Revisited: A Case Study from Egypt," *Peace Economics, Peace Science and Public Policy*, 17, 1-19.

Caputo, D. A., (1975), "New Perspective on the Public Policy Implications of Defence and Welfare Expenditures in Four Modern Democracies: 1950-1970," *Policy Sciences*, 6, 423-446.

Davis, D. R. and S. Chan, (1990), "The Security-Welfare Relationship: Longitudinal Evidence from Taiwan," *Journal of Peace Research*, 27, 87-100.

Deger, S., (1985), "Human Resource, Government's Education Expenditure and the Military Burden in Less Developed Countries," *Journal of Developing Areas*, 20, 37-48.

Domke, W. K., R. C. Eichenberg, and C. M. Kelleher, (1983), "The Illusion of Choice: Defence and Welfare in Advanced Industrial Democracies 1948-1978," *American Political Science Review*, 77, 19-35.

Eichenberg, R. C., (1984), "The Expenditures and Revenue Effects of Defence Spending in the Federal Republic of Germany," *Policy Sciences*, 16, 391-411.

Eryigit, S. B., K. Y. Eryigit, and U. Selen, (2012), "The Long Run Linkages between Health and Defense Expenditures and Economic Growth: Evidence from Turkey," *Defense and Peace Economics*, 23, 559-574.

Frederiksen, P. C. and R. E. Looney, (1994), "Budgetary Consequences of Defense Expenditures in Pakistan: Short-Run Impacts and Long-Run Adjustments," *Journal of Peace Research*, 31, 11-18.

Hess, P. and B. Mullan, (1988), "The Military Burden and Public Education Expenditures in Contemporary Developing Nations: Is There a Trade-Off?" *Journal of Developing Area*, 22, 497-514.

Hatemi-J, A., (2003), "A New Method to Choose Optimal Lag Order in Stable and Unstable VAR Models," *Applied Economic Letters*, 10, 135-137.

Hatemi-J, A., (2012), "Asymmetric Causality Tests with an Application," *Empirical Econonomics*, 43, 447-456.

Hatemi-J, A. and G. S. Uddin, (2012), "Is the Casual Nexus of Energy Utilization and Economic Growth Asymmetric in the US?" *Economic Systems*, 36, 461-469.

Kollias, C. and S. M. Paleologou, (2011), "Budgetary Trade-Offs between Defence, Education and Social Spending in Greece," *Applied Economics Letters*, 18, 1071-1075.

Lin, E. S., E. A. Hamid, and Y. L. Lu, (2015), "Does Military Spending Crowd out Social Welfare Expenditures? Evidence from a Panel of OECD Countries," *Defence and Peace Economics*, 26, 33-48.

Mintz, A., (1989), "Guns versus Butter: A Disaggregated Analysis," *American Political Science Review*, 83, 1285-1293.

Peroff, K. K. and M. Podolak-Warren, (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.

Russett, B. M., (1969), "Who Pays for Defence?" *American Political Science Review*, 63, 412-426.

Russett, B. M., (1982), "Defence Expenditures and National Well-Being," *American Political Science Review*, 76, 767-777.

Toda, H. Y. and T. Yamamoto, (1995), "Statistical Inference in Vector Autoregressions with Possibly Integrated Processes," *Journal of Econometrics*, 66, 225-250.

Töngür, Ü. and A. Y. Elveren, (2015), "Military Expenditures, Income Inequality, Welfare and Political Regimes: A Dynamic Panel Data Analysis," *Defense and Peace Economics*, 26, 49-74.

Yildirim, J. and S. Sezgin, (2002), "Defence, Education and Health Expenditures in Turkey 1924-96," *Journal of Peace Research*, 39, 569-580.

Xu, Y., H. L. Chang, C. W. Su, and A. Dumitrescu, (2017), "Guns for Butter? Empirical Evidence from China," *Defense and Peace Economics*, http://www.tandfonline.com/loi/gdpe20P, published online: 22 Feb 2017.

Zhang, Y., X. Li, J. Xu, and R. Wang, (2017), "Does Military Spending Promote Social Welfare? A Comparative Analysis of the BRICs and G7 Countries," *Defense and Peace Economics*, 28, 686-702.