Warfare-Welfare Trade-off in the Fiscal Space of High-Income OECD Countries

Gábor Kutasi – Ádám Marton – Grzegorz Waszkiewicz[1]

Abstract

The analysis of the relationships between defense expenditures and social expenditures has been one of the important areas of economic research for several decades. This process has recently been further increased by geopolitical uncertainties and the increase in military spending. Nevertheless, the international literature represents significant heterogeneity in the analyses of the relationships between the two factors. Three main approaches can be delineated: direct approach, crowding-out effect and indirect approach. The purpose of this paper is to analyze the impact of changes in defense spending on individual economic factors and social spending through the channels identified in the indirect and crowding effect approaches among the theoretical approaches. In the empirical analysis, the highly developed countries of the OECD were examined between 1998 and 2022 using a panel Vector Error Correction (VEC) model. The empirical results cannot justify the trade-off relationship between defense spending and welfare spending.

JEL: F62, H56, H87, I38

Keywords: defense, VECM, guns or butter, trade-off, OECD

[1] Kutasi Gábor, Ludovika University of Public Service, kutasi.gabor@uni-nke.hu, https://orcid.org/0000-0001-7381-4935

Marton Ádám, Ludovika University of Public Service, marton.adam@uni-nke.hu, https://orcid.org/0000-0002-1268-4679

Grzegorz Waszkiewicz, Military University of Technology, Warszaw, *grzegorz.waszkiewicz@wat.edu.pl*, https://orcid.org/0000-0002-8783-6972

Corresponding author's e-mail address: kutasi.gabor@uni-nke.hu, phone: +36205417032

1. Introduction

The guns or butter dilemma is a special case of the welfare cost by the redistribution of public funds which arises from the choice between the defense spending with negative sum and the welfare expenditures. The Russian-Ukrainian military conflict activated this fiscal dilemma in various regions of Europe.

The relationship between military expenditure and social spending is a complex and contested issue. Some argue that there is a trade-off between the two, meaning that an increase in one leads to a decrease in the other. Others argue that there is no such trade-off, or that the relationship may even be positive. The literature can therefore be considered clearly heterogeneous in question. In addition, the mechanisms can appear differently with different approaches, and they can exert their effects in both the short and long term. Primarily, three approaches can be defined based on the literature: the direct approach, the indirect approach, and the crowding-out effect approach.

The purpose of this paper is to analyze the impact of changes in defense spending on individual economic factors and social spending through the channels identified in the indirect and crowding effect approaches among the theoretical approaches. In the case of the indirect approach, the model based on the investment multiplier was developed, while in the case of the crowding-out effect approach, the model was based on the traditional crowding-out effect and its variables. Based on the cointegration identified between the variables during the empirical analyses, a vector error correction model (VEC) was developed during the analysis of both theoretical approaches. The analyzes were carried out between 1998 and 2022 in the highly developed countries of the OECD. The empirical results can be considered robust in terms of economic considerations, they are coherent with the theoretical relationships, and do not justify the trade-off relationship between defense spending and welfare spending. Moreover, based on the results of the model, the increase in defense spending can also have a positive effect in social spending.

2. Proofs and doubts: direct link, crowding-out effect, indirect link

One of the welfare dilemmas in fiscal economics is the guns or butter trade-off. The key theoretical arguments on guns or butter dilemma can be sorted to three stages of a theoretical development trajectory: the direct link, the crowding-out and the indirect link. The original *direct link* assumption is based on public budget constraint and approaches the problem as a static zero-sum game and searched the negative welfare expenditure effects of a shift towards

military spending. This argument suggests that there is a fixed amount of government resources available, and that an increase in military expenditure must come at the expense of social spending. This argument is based on the idea that governments are constrained by their budgets. Its advanced version incorporated the growth – and tax impact of fiscal rearrangement as a backlash on defense financing from tax based on national income. Russet (1969) described the logic of direct link which estimated the redistribution of public expenditures from social purposes toward defense spending with linear regression and concluded negative impact on consumption, investment and net export, i.e. the national income as a base of public finances.

To exceed the dilemma and to avoid the welfare-warfare redistribution, there is an opportunity for increasing fiscal space, if governments take into consideration tax reforms or development of tax administration and, thus, generating additional revenue. Lower-priority expenditures can be reduced to allocate resources to more critical areas. Domestic or external borrowing can provide additional funds, and governments can also utilize seigniorage. It's crucial to maintain a medium-term expenditure framework that prioritizes spending and ensures the availability of present and future budgetary resources. This flexibility allows governments to respond to unexpected fiscal challenges. When nondiscretionary spending consumes a significant portion of the budget, discretionary spending options are limited. Therefore, future budget projections should avoid overcommitting resources. Additionally, significant inflows of external funds earmarked for specific sectors can create future spending obligations, potentially limiting the growth of domestic budgetary resources. (Heller, 2005)

A few years before the war Botev et al. (2016) already surveyed the fiscal space in OECD countries including several European NATO members. They concluded about the fiscal space that interest rates on government debt were very low in advanced economies due to exceptional monetary stimulus, which has led to savings through reduced interest payments. Consequently, measures of fiscal space—defined by the gap between actual debt and levels that would compromise market access—have increased in most OECD countries since 2014, as lower interest rates have outweighed the effects of lower potential growth and higher debt. Additionally, measures accounting for projected long-term aging-related spending pressures suggest there is some fiscal space in most larger advanced economies, although the situation is more uncertain in Italy depending on the focus of the fiscal analysis. Structural reforms can further enhance fiscal space, and the current increase in fiscal space provides an opportunity for countries to engage in long-term borrowing and fiscal initiatives aimed at boosting productivity and long-term growth, tailored to their specific economic conditions which meant significant

buffer for financing. However, since this conclusion financing Covid crisis has already burned a significant part of the fiscal space for borrowing money. Romer and Romer (2019) represent a more various image about European fiscal space. Their multidimensional methodology includes financial distress, CDS spreads (as the proxy of market access), debt-to-GDP etc. They establish that a nation's fiscal response to a crisis is contingent upon its pre-existing debt-to-GDP ratio. Over the past four decades, both market access and the decisions made by policymakers have been pivotal in shaping fiscal responses to crises. However, the choices made by policymakers have been somewhat more influential. As they concluded, the fiscal response of a country to a crisis is significantly influenced by its pre-crisis debt-to-GDP ratio. Countries with lower pre-crisis debt levels adopt more expansionary fiscal policies compared to those with higher debt levels. The study reveals that the debt-to-GDP ratio impacts policymakers' decisions beyond its effect on market access, as evidenced by long-term government bond yields and sovereign debt ratings. Additionally, narrative evidence from the Economist Intelligence Unit highlights that both market access and policymakers' choices play crucial roles, with the latter being significantly influenced by the debt-to-GDP ratio.

The evidence on the relationship between military expenditure and social spending is mixed. Some studies have found a trade-off between the two, while others have found no such trade-off, or even a positive relationship. The results of the studies seem to vary depending on the country, the time period, and the specific social spending category being examined. There are several studies about negative trade-off. Peroff (1976) shows that high defense spending imposes a constraint on welfare-oriented public spending programs, with adverse effects on economically disadvantaged segments of society. Dabelko and McCormick (1977) found evidence of opportunity costs of defense spending. They used bivariate regression on developed and developing countries in time range 1950-1970, and found significant negative effects in some periods. They concluded that frequency of a significant result also depends on the political/governmental system. Verner (1983) applied linear regression in relevance of Latin America, 1948-1979. The results were significant differences in the trade-offs between defense and education spending across Latin American countries. Chen, Liang & Lin, (2018) tested more models with 2SLS, LIML, and GMM approach on 133 countries between 1960 and 2012. They proved that 1% increase in defense spending leads to a decrease in the GDP growth rate of more than 1 percentage point. Thus tax base impact is negative which can result in lower social spending or higher deficit. Yildirim & Sezgin (2003) find that there is a trade-off between defense and health spending in Turkey.

However there are confusing studies which cannot demonstrate the negative trade-off or identify positive link, or even both directions. Russett (1982) detected with OLS model about the USA in 1941-1979 that education spending was positively affected by the increase in defense spending, while health was negatively affected. Caputo (1975) used Pearson's correlation and standardized regression to examine the relationship between military expenditure and social spending in Australia, Sweden, the United States, and the United Kingdom from 1950 to 1970. He found that there was a positive relationship between military expenditure and health spending, but a negative relationship between military expenditure and education spending. Looney (1986) tested bivariate regressions, but could not confirm any trade-off between defense and education expenditure as trade-offs varied from country to country in Latin America, 1972-1983. Lin, Ali, and Lu (2015) uses panel data analysis to examine the relationship between military expenditure and social spending in OECD countries from 1988 to 2005. They find that there is a positive relationship between the two, meaning that an increase in military expenditure leads to an increase in social spending. Their explanation is that developed countries demand social welfare programs. This statement spotlights on the policy factor.

Some studies with mixed results concluded that policy matters. Carter et al. (2021) applied VAR model about USA, 1947-2007 and suggested that the economic policy preference determines whether the trade-off is positive or negative. If welfare is more important, the trade-off is positive, if the debt sustainability has priority, then negative. Whitten & Williams (2011) could distinguished with a panel model for 19 developed countries in 1952-1997 that hawkish and dovish political behavior affects the trade-off. Williams (2018), who argues that, from an income and welfare perspective, defense and social spending are complementary and writes about the military as a disguised social spending, uses a logit model, cross-sectional analysis, and meta-analysis to examine the relationship between military expenditure and social spending in 27 developed countries from 1985 to 2008. He finds that the trade-off depends on the policy character whether economic policy finances job creation through public finances or not.

The second stage of warfare-welfare trade-off is the *crowding-out* approach. This approach is similar to the direct link, but it emphasizes the role of interest rates. According to this argument, an increase in military expenditure will be covered by bigger debt financing instead of intra-budget rearrangement which will result in higher interest rates. The higher rates finally will crowd out private investment and reduce economic growth, the base of potential tax revenues covering the social spending, too. The lower tax revenues will make it more difficult for the

government to finance social spending. Based on the crowding-out approach, Apostolakis (1992) was able to confirm the existence of a crowding-out effect by examining the elasticity between defense and social expenditure. Nevertheless, his OLS model on Latin America, 1953-1987 resulted in mixed outcomes with positive and negative or even none trade-offs. Zhang et al. (2016) concluded that social spending in developed countries is growing alongside defense spending, but in emerging countries the effect is mixed according to their panel cointegration and impulse response function about G7 and BRICS, in 1998-2011 and 1993-2007. Biscione and Caruso (2021) use panel regression analysis to examine the relationship between military expenditure and social spending in transition economies from 1990 to 2015. They find that military expenditure has a negative impact on social spending, but that this effect is only significant for education spending. Ikegami and Wang (2023) established that level of development matters and GDP growth neutralizes the crowding-out effect of defense spending on health spending. The lower the income of the country, the stronger the negative trade-off. They find that defense spending has a crowding-out effect on health spending. They based their conclusion on GMM test for 116 countries' data during 2000-2017.

Finally, the third approach is the indirect link. Minz and Huang (1991) raised the aspect that defense spending is not merely an expenditure demand for debt financing in public finances with crowding-out effect in the capital market, but it can be also capacity building in industry, i.e. an investment-multiplier. Therefore, the multiplier effect should be analyzed. Minz and Huang (1991) applied Breusch-Pagan test for USA data in 1953-1987. This way they could distinguish negative short-term, but positive long-term relationship between defense and social spending. The positive long-term (over-year) effect supports the assumption about investment multiplier. Same conclusion is drawn by Elish et al. (2023) by their ARDL model, about Egyptian data for 1980-2021, that there has been negative trade-off in the short term, and positive in the long term. The model creation was formed based on these approaches.

3. Methodology and data

3.1. Model

During the empirical analyses, it was based on the theoretical relationships identified in the previous chapter. Based on these, the modeling of the three main approaches was taken as a basis. First, the following variables are included in the model

- Defense spending (DS) – Military expenditure (% of GDP) from SIPRI;
- Annual growth of real GDP (DGDP) – Annual percentage growth rate of GDP per capita (annual %);

- Gross fixed capital formation (GFCF) – Average annual growth of gross fixed capital formation based on constant local currency (annual % growth);
- General government deficit/surplus (DEF) – General government net lending/borrowing (% of GDP);
- Social protection expenditure (SOC) – COFOG 10 statistics, (% of GDP)
- Tax revenue (TAX) – Government revenue (% of GDP).

The starting point of the empirical analysis is the traditional vector autoregression model (VAR) framework. By including several variables, VAR models create an opportunity to analyse the effects between time series. This was extended to the panel database during the analysis. In addition, Johansen's cointegration test was used to examine cointegration and the existence of a long-term relationship between variables. Based on the results of the test, it can be concluded that cointegration exists for both model formulas, which justifies the use of the vector error correction (VEC) model. Based on these, the framework of panel VEC model was applied during both theoretical approaches. Based on Lütkepohl-Krätzig (2004, p. 90), the VEC model can be written with the following equation:

$$\Delta y_t = \Pi y_{t-1} + \Gamma_1 \Delta y_{t-1} + \cdots + \Gamma_{p-1} \Delta y_{t-p+1} + u_t \qquad (1)$$

where $\Pi = -(I_K - A_1 - \cdots A_p)$ and $\Gamma_i = -(A_{i+1} + \cdots + A_p)$, as well as $i = 1, \dots p-1$. During the model, Cholesky decomposition was used, which assumes their influence on each other based on the order between the variables.

With the inclusion of the above variables, the theoretical relationships identified in relationship with the literature review and the order of the variables would be as follows:

- The direct approach is described by the following logic:

  DS → DEF → DGDP → TAX → GFCF → SOC

- The crowding-out approach can be turned into this order:

  DS → DGDP → TAX → DEF → GFCF → SOC

- The indirect approach means the next equation for the model. As it focuses on the investment multiplier, it lacks DEF:

  DS → GFCF → DGDP → TAX → SOC

This paper analyses only by the crowding-out and the indirect approach. The reason is, that, first, the direct approach showed so many failures in previous literature, and second, the crowding-out approach is an advanced version of the direct link. This way there is no sense to execute the less developed version.

3.2. Data

The database is composed of the panel dataset of 28 OECD countries from 1998 until 2022. The database contains the following countries: Australia, Austria, Belgium, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States. Some OECD countries were not included. These economies are following Canada, Chile Japan, Korea, New Zealand, because the data were not available for certain variables at the beginning of the period or for the entire period for the individual countries. Shortening the period would have significantly reduced the time dimension of the database, which could have distorted the robustness of the results. For this reason, the above economies were excluded from the examination database.

The model specification is composed from Levin-Lin-Chu test for stationarity. The stationarity test indicated that DS, DGDP, GFCF, DEF and SOC are stationary at level, TAX is with first difference. Based on the Johansen cointegration test, the number of cointegration vector is 2 in case of crowding-out model and 3 in case of indirect relationship model. The lag length was determined based on the following three information criteria: Akaike information criteria, Schwarz information criteria and Hannan-Quinn information criteria. Based on these lag length is 2 in both models. The analyzes were made in the Eviews program.

Table 1. Descriptive statistics

	Mean	**Std. Dev.**	**Min.**	**Max.**	**No. of Obs.**	**Sources**
DS	1,66	1,10	0,00	6,98	700	World Bank
GFCF	3,10	9,78	-47,46	100,69	700	World Bank
DGDP	2,03	3,55	-14,46	23,30	700	World Bank
SOC	15,81	4,45	6,44	27,08	697	IMF Database,

	Mean	Std. Dev.	Min.	Max.	No. of Obs.	Sources
						Eurostat
TAX	42,72	7,28	22,19	63,86	700	IMF Database, Eurostat
DEF	-2,19	4,43	-32,10	25,40	695	IMF Database

Source: authors' calculations, based on Eurostat, OECD, IMF, and World Bank Data.

4. Results

During the analysis, it was analyzed whether the crowding-out approach or the direct approach prevails in the case of defense spending. The impulse-response functions related to the two approaches are included in Figures 1-2.

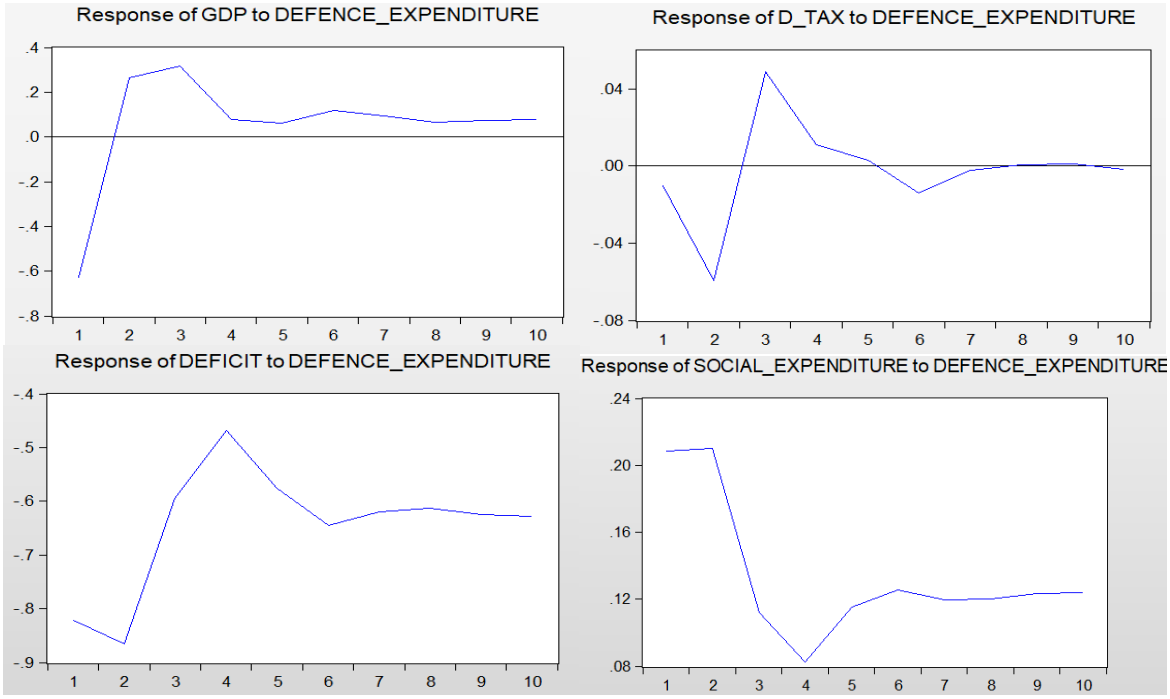


Figure 1. The impulse response of crowding out effect model

Source: authors' calculation

In the case of the GDP variable, it can be established that there is initially a negative GDP effect, which will then turn into a positive one and fade away. Based on these, it can be established that the initial crowding-out effect appears, which, however, is eliminated in the long term and is generated as a positive effect. This represents a close relationship with the budget side in terms of tax revenues and the budget deficit. In the case of the tax revenue the

initial negative tax effect will turn positive and fade away in the crowding out effect model. In the case of the deficit, there is a clear negative effect. These are consistent with economic theories. There is a clear positive effect in the social spending variable. With this, our model is clearly connected to the theoretical relationships that have identified a positive effect. This means that an increase in defense spending does not entail a decrease in welfare spending and may even induce a positive effect on it. That is, in the case of welfare expenditures and defense expenditures, the trade-off relationship cannot be identified in the case of the crowding out effect model.

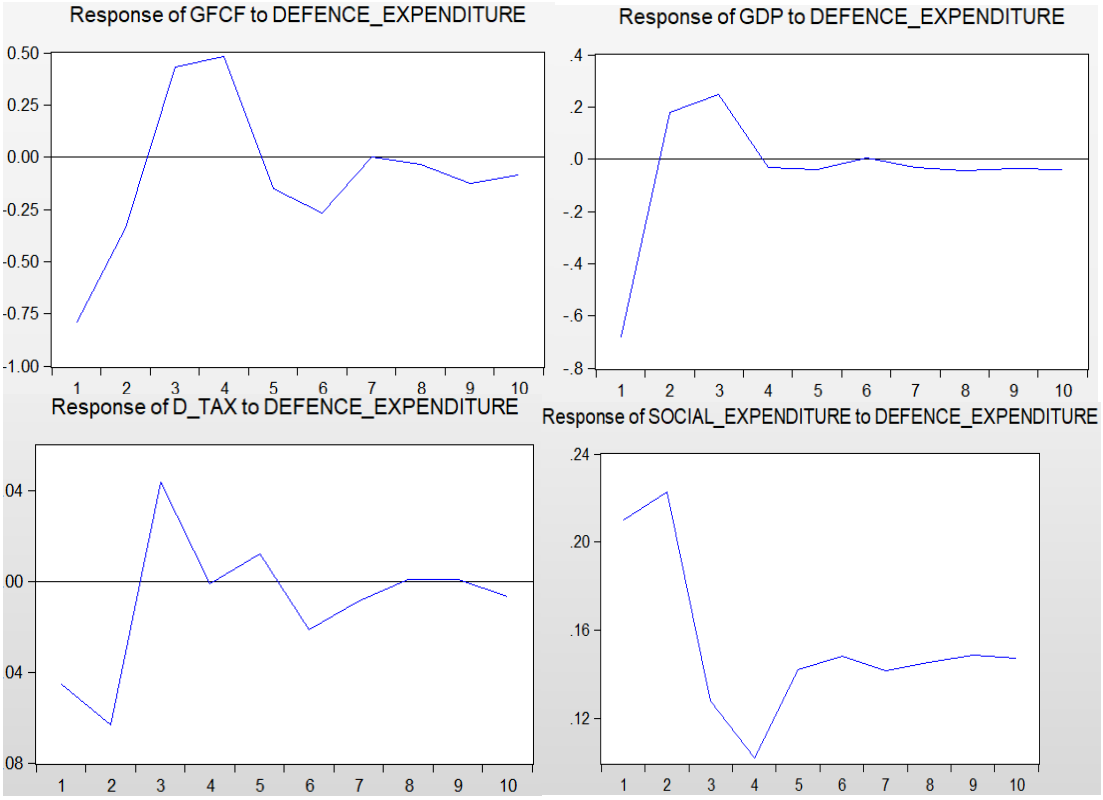


Figure 2. The impulse response of indirect model

Source: authors' calculation

The second model examined the effects of the indirect approach, which contains the investment multiplier approach. The results are similar to the crowding out effect model. There is an initially negative GFCF effect, which will then turn into a positive one and fade away. Based on these, it can be concluded that the positive investment multiplier effect occurs in the long term. Closely related to this is the GDP effect, similar to the crowding out effect model. That is it can be established, that there is an initially negative GDP effect, which will then turn into a positive one and fade away. There is no difference between the results of the two models in terms of the effects of tax revenues. The initial negative tax effect will turn positive and fade away. Furthermore, there is a clear positive effect in the area of social spending. Based on these

results, the indirect model is also connected to the theoretical connections where defense spending can have a positive effect on social spending. Based on these, it can also be concluded that the trade-off effect cannot be detected based on the analyses. The two empirical models based on different theoretical approaches led to similar results, based on which the results can be considered robust.

5. Discussion and conclusion

The paper examined the relationship between military spending and welfare spending. The relationship between the two variables is extremely complex from a theoretical point of view and can occur through several channels. Based on these, three approaches were identified during the literature review: direct approach, indirect approach and crowding-out effect. No consensus can be found between the empirical studies on different approaches. The individual results support the positive, negative, or neutral effect in terms of the trade-off between the two variables.

During the empirical studies, two channels were examined in this paper: crowding out effect and indirect effect. The analyses were performed in a panel VEC model framework. Based on both models, it can be established that changes in defense spending may initially cause a drop in GDP, however, this quickly (after one period) transforms into a positive effect. A similar effect can be shown with regard to tax revenues, where the initial negative effect turns into a positive one. On the other hand, with regard to the last common variable, social spending, both models showed a positive relationship with regard to the variables. Examining the difference between the two approaches, it can be established that the increase in the deficit occurs in the short term with the crowding out effect model, and then it starts to consolidate. In addition, with the indirect approach that identifies the investment multiplier effect, the short-term negative side of the investment effect will turn into a positive effect. It can be concluded that the increase in defense spending does not have negative macroeconomic consequences. Turbulent effects may occur in the short term; however, these are followed by positive consequences that can offset short-term negative relationships. Besides, the results of our VEC models show the trade-off effect cannot be identified. Furthermore, a clear positive effect was shown in terms of social spending. It is necessary to point out that most of the empirical analysis can be done for the 2020s in the topic area. However, the economic environment before 2020 and the pandemic

changed the attitude towards the sustainability of public debt. This entails that investors are much more tolerant of higher debt, which also results in the state being able to increase its debt stock with greater probability and on better terms, so the crowding-out effect is less effective.

The current analysis used crowding-out and indirect link approach, nevertheless, the results can confirm the conclusion of those papers based on direct link approach which confirmed the existence of trade-off both in positive and negative way (Russett 1982; Caputo, 1975; Looney, 1986) and falsifies the failed attempt by Looney (1986). The current results are consonant with Apostolakis (1992) from the crowding-out perspective. Referring to the studies based on the indirect link approach, the current results based on different model confirms the short-term negative and long-term positive trade-off indicated by Minz and Huang (1991) and Elish et al. (2023). The current model did not distinguish by policy and analyzed merely high developed economies, thus, the results are neutral toward those studies in the literature review which focuses on policy and development differences.

The overall conclusion is that defense spending needs time lagging to induce positive effect on welfare spending, and negative trade-off is expectable merely in the first one or two years. Based on the literature review, of course, the long-term positive effect and its extent can depend on policy and structure of spending.

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