dr hab. Piotr KRAJEWSKI, prof. UŁ

University of Lodz
e-mail: piotr.krajewski@uni.lodz.pl
ORCID: 0000-0002-5377-9578

dr Katarzyna PIŁAT

University of Lodz
e-mail: katarzyna.pilat@uni.lodz.pl
ORCID: 0000-0002-9364-8863

THE COMPARISON OF THE IMPACT OF MILITARY AND NON-MILITARY GOVERNMENT SPENDING ON GDP AND CONSUMPTION IN POLAND[1]

Summary

Purpose – The purpose of the article is to compare the macroeconomic effects of military and non-military government spending on the Polish economy, which is particularly relevant in the context of the rapid rise in military spending after the outbreak of the war in Ukraine.

Research method – The research is based on a new-Keynesian dynamic stochastic general equilibrium model estimated for the Polish economy. The model developed for the study takes into account differences between 3 types of government spending – military spending, non-military current spending and non-military investment.

Results – On the one hand, the empirical results show that in the short and medium term, increasing military spending is a more effective method of stimulating GDP than rising non-military spending. On the other hand, the impulse response functions indicate that increasing non-military spending is a better tool for enhancing effective consumption.

Originality/value/implications/recommendations – This is the first research exploring the macroeconomic effects of military spending in a CEE country, which is based on stochastic general equilibrium model accounting for heterogeneity of government spending. Assessing these effects at a time of unprecedented growth in military spending in Poland is

---

an important added value of the study. The main implication of the research is to recommend increasing military spending to boost GDP, while rising non-military spending to stimulate effective consumption.

1. Introduction

The outbreak of the war in Ukraine caused the fact that the importance of military government spending in many European countries increased. A particularly strong rise in military spending took place in Poland. In 2021 military spending in Poland amounted to 2.3 percent of GDP whereas in 2023 rose up to 3 percent of GDP. Thus, the issue of the macroeconomic effects of military spending becomes especially important. In particular, of special relevance is the answer to the question of whether military spending has a stronger or weaker impact on GDP than non-military spending.

There has been a long debate about the long-term impact of military and non-military government spending on the economy, often referred to as the guns-or-butter problem [d'Agostino et al., 2012, Carter et al., 2021]. It should be noted that empirical studies show mixed findings concerning the effectiveness of military spending in stimulating economic growth [see e.g. Atesoglu, Mueller, 1990; Brumm, 1997; Chen et al., 2014; Dunne, Tian, 2015; Compton, Paterson, 2016; Hung-Pin, Wang, 2022; Karamanis, 2022]. Dunne, Tian [2013], in a meta-analysis based on 170 studies, found a negative long-term relationship between military government spending and GDP in about 44% of studies, a positive relationship in about 20% of analysed studies, whereas about 40% of studies show ambiguous results. In the long term, the most important is the impact of military spending on the total factor productivity and investment [Lobont et al., 2019; Mohanty et al., 2020]. However, in the short and medium run, the impact of military spending on consumption is crucial, i.e. whether government military spending has the same impact on private consumption as non-military government spending. According to micro-based models, i.e. those that take into account household behaviour, the higher the substitution between the public and private consumptions is, the weaker the effect of government spending on aggregate demand and economic activity [Karras, 1994; Kwan, 2009; Ercolani,

Azevedo, 2014]. However, this mechanism is relatively rarely analysed in the literature concerning military spending. In particular, there is a lack of such studies for Central and Eastern European countries.

This article presents the first comparative analysis of the impact of military and non-military spending on GDP in a CEE country, based on the model taking into account the heterogeneity of government spending in terms of its substitutability with private consumption and its impact on public capital.

This analysis is especially justified because of, on the one hand, the rise of the role of military spending after the outbreak of the war in Ukraine, and, on the other hand, the increased role of government spending as a tool of anticyclical macroeconomic policy in the context of the projected economic slowdown [Afonso et al., 2018]. It should be noted that an analysis based on micro-foundations that takes into account the substitution between private and public consumption enables not only to analyse the impact of military spending on GDP, but also to assess the impact of military spending on the level of private consumption. This is of special importance in terms of the analysis of the impact of spending on household utilities and, more generally, on the standard of living.

Thus, the purpose of the article is to compare the impact of military and non-military spending on both GDP and consumption in Poland. Military spending is defined in the study as defence government spending incurred to maintain Poland's external security.

The added value of the paper is that it compares macroeconomic effects of military and non-military spending at a time of unprecedented growth in military spending in Poland.

It should be however highlighted that, in the current geopolitical situation, the necessity to increase military spending is mainly based on defence grounds. As a result, regardless of the economic impact of military spending on the Polish economy, the possibility of substituting military government spending with non-military government spending is limited, due to the need to modernize and increase the national defence potential in order to ensure the long-term protection of Poland's sovereignty.

The structure of the paper is as follows. The first chapter shows the assumptions of the theoretical dynamic stochastic general equilibrium model on the basis of which the effects of military and non-military spending were compared. This is followed by the presentation of the impulse response functions for the Polish economy and a comparison of the impact of military and non-military spending on GDP and consumption in Poland. The final section contains conclusions.

2. Theoretical model

The impact of the military and non-military government spending is analysed on the theoretical basis of New-Keynesian dynamic stochastic general equilibrium model. The advantage of this kind of a model is that it takes into account both demand-side and supply-side impact of military spending on economy, and thus is a useful tool of analysing the overall macroeconomic effects of military spending [see e.g. Lorusso, Pieroni, 2017; Becerra-Vicario et al., 2020]. The model takes into account the fact that the impact of government spending on GDP depends on whether the spending is current government spending or public investment, which increases total productivity in the economy [Kamps, 2004]. Moreover, in case of current expenditure, the impact of fiscal policy on households' decisions depends on the substitutability of a given government spending relative to private consumption [Kwan, 2006; Ercolani, Azevedo, 2014].

Thus, as far as supply-side effects of government spending are concerned, three kinds of spending should be distinguished:
  - current government spending which is not a substitute for private consumption,
  - current government spending which is partly a substitute for private consumption,
  - capital government spending (public investment) leading to an increase in public capital and thus economy's production capacity.

Military spending is not a substitute for private consumption and it does not directly translate into economy's production capacity. Non-military current spending is partly a substitute for private consumption (e.g. education and health care) but it does not increase public capital. Non-military public investment is not a substitute for private consumption, however, it increases public capital and thus also enhances economy's production capacity.

It is assumed that the household utility depends on leisure and so-called effective consumption [Christiano, Eichenbaum, 1992]. Effective consumption is the households' consumption of goods and services resulting from their private spending and public spending. For example, consumption of health services depends both on private and public spending on health.

Thus, households maximise the expected value of the following sum of discounted utilities:

$$E_t \sum_{t=0}^{\infty} \beta^t ln\left(c_t + \gamma\, g_t^{SUBST} \right) + \vartheta(1 - l_t\,), \qquad\qquad 1)$$

where:
E_t – expected value in period t,
β – discount factor,
c_t – private consumption,
g_t^{SUBST} – current government spending which is partly a substitute for private consumption (which is non-military current government spending),
γ – rate of substitution between private consumption and non-military current government spending),
l_t – labour,
ϑ – parameter describing the role of leisure in households' preferences,
$\beta \in (0,1)$,
$\gamma \in (0,1)$,
$\vartheta > 0$.

As a consequence, households in their decisions concerning the level of effective consumption take into account government spending which is partly a substitute for private consumption, which is non-military current government spending. On the contrary, military government spending does not affect the level of effective consumption of households and their utility.

The distinction between non-military current and investment government spending is important from the point of view of the production function. Government investment expenditure may affect the production capacity of the economy, as shown in the production function below:

$$y_t = k_t^\alpha l_t^{1-\alpha} \left(k_{t-1}^{PUBL} \right)^{\alpha_{PUBL}},$$ 2)

where:
y_t – output,
k_t – private capital,
k_t^{PUBL} – public capital,
α – private capital elasticity of output,
α_{PUBL} – public capital elasticity of output,
$\alpha \in (0,1)$,
$\alpha_{PUBL} \in (0,1)$.

Thus, public capital affects the capacity of private production factors of production [Kamps, 2004].

The public capital increases according to the capital growth equation:

$$k_t^{PUBL} = \left(1-\delta\right) k_{t-1}^{PUBL} + g_t^{INV},$$ 3)

where:
g_t^{INV} – capital government spending increasing productive public capital (non-military public investment),
δ – depreciation rate,
$\delta \in (0,1)$.
An analogous relationship occurs with private capital:

$$k_t = \left(1-\delta\right)k_t + i_t \,, \qquad\qquad 4)$$

where:
i_t – private investment.

Final goods are produced based on intermediate goods:

$$Y_t = \left(\int_0^1 y_t(i)^{\frac{1}{1+\lambda_{p,t}}}\, di \right)^{1+\lambda_{p,t}} , \qquad\qquad 5)$$

where:
$y_t(i)$ – intermediate good of type i,
$\lambda_{p,t}$ – parameter describing markup,
$\lambda_{p,t} > 0$.

Intermediate goods are produced by companies operating under monopolistic competition.

The final goods are allocated for consumption, investment or one of the three analysed types of government spending. Thus, aggregate demand is a sum of the following components:

$$c_t + i_t + g_t^{SUBS} + g_t^{NSUBST} + g_t^{INV} = y_t \,, \qquad\qquad 6)$$

where:
g_t^{NSUBST} – government spending which is not a substitute for private cosumption (which is military government spending).

The budget constraint of households and the budget constraint of government are as follows:

$$\sum_{t=1}^{\infty} \frac{c_t}{(1+r_1}\left(1+r_2\right)\ldots\left(1+r_t\right)} = k_0 + \sum_{t=1}^{\infty} \frac{w_t - tax_t}{(1+r_1}\left(1+r_2\right)\ldots\left(1+r_t\right)} \,, \qquad\qquad 7)$$

$$\sum_{t=1}^{\infty} \frac{g_t^{SUBS} + g_t^{NSUBST} + g_t^{INV}}{(1+r_1)(1+r_2)...(1+r_t)} = \sum_{t=1}^{\infty} \frac{tax_t}{(1+r_1)(1+r_2)...(1+r_t)} \ , \tag{8}$$

where:
r_t – interest rate,
w_t – wage,
tax_t – taxes.

Interest rate results from the monetary policy, which is conducted by central bank according to the Taylor [1993] rule. It means that the interest rate set by central bank depends on:
  – the difference between current GDP and potential output,
  – the difference between the current rate of inflation and central bank's inflation target.

The rigidities in prices are taken into account in the model. Prices are set according to the scheme described by Calvo [1983]. It means that it is assumed that the probability that a firm will set price is constant, and independent on previous decisions of a firm [Erceg et al., 2000, Kollmann, 2001]:

$$P_t = \left((1-\xi_p) P_{IND,t}^{-\frac{1}{\lambda_{p,t}}} + \xi_p P_{OPT,t}^{-\frac{1}{\lambda_{p,t}}} \right)^{-\lambda_{p,t}} , \tag{9}$$

where:
$P_{IND,t}$ – indexing price,
$P_{OP,t}$ – price optimized by firms,
ξ_P – probability that firms will optimize price,
$\xi_P \in (0,1)$.

Rigidities are also included in labour market. It is assumed that wages are set on the basis of the Calvo [1983] scheme, analogously to prices. Wage is described by the following formula:

$$W_t = \left((1-\xi_w) W_{IND,t}^{-\frac{1}{\lambda_{w,t}}} + \xi_w W_{OPT,t}^{-\frac{1}{\lambda_{w,t}}} \right)^{-\lambda_{w,t}} , \tag{10}$$

where:
$W_{IND,t}$ – indexed wage,
$W_{OP,t}$ – wage optimized by households,

ξ_w – probability that households will optimize wage,
$\xi_w \in (0,1)$.

Moreover, it is taken into account that the labour market is a monopolistically competitive market.

The structure of the model implies that government spending has both supply and demand effects on the economy. However, it should be mentioned that the model assumes that there occurs Ricardian equivalence, as postulated by Barro [1974]. It means that the impact of government spending does not depend on whether it is financed by public debt or taxes. Nevertheless, in real economies Ricardian equivalence often does not occur, which is a result of a liquidity constraints, a finite planning horizon or following practical rules [Galí et al., 2004]. In the absence of Ricardian equivalence, debt accumulation leads to a greater rise in the interest rate and crowding-out private investment, which can undermine the stimulative effect of government spending on GDP.

In the model, the changes of each kind of government spending are described by autoregressive processes:

$$g_t^{NSUBST} = \left(1 - \rho_g\right)\bar{g}_{NSUBST} + \rho_g g_{t-1}^{NSUBST} + \zeta_{NSUBST,t}, \qquad 11)$$

$$g_t^{SUBST} = \left(1 - \rho_g\right)\bar{g}_{SUBST} + \rho_g g_{t-1}^{SUBST} + \zeta_{SUBST,t}, \qquad 12)$$

$$g_t^{INV} = \left(1 - \rho_g\right)\bar{g}_{INV} + \rho_g g_{t-1}^{INV} + \zeta_{INV,t}, \qquad 13)$$

where:
ρ_g – parameter showing the persistence of government spending impulses (persistence of government spending changes),
$\bar{g}_{NSUSUBST}$ – average level of military government spending,
$\bar{g}_{SUSUBST}$ – average level of non-military current government spending,
$\bar{g}_{INV}$ – average level of non-military public investment,
$\zeta_{NSUSUBST,t}$ – military government spending impulses,
$\zeta_{SUSUBST,t}$ – non-military current government spending impulses,
$\zeta_{INV,t}$ – non-military public investment impulses,
$\rho_g \in (0,1)$,
$\bar{g}_{NSUSUBST}, \bar{g}_{SUSUBST}, \bar{g}_{INV} > 0$,
$\zeta_{NSUSUBST,t} \sim N(0, \sigma_{NSUBST}^2)$,
$\zeta_{SUSUBST,t} \sim N(0, \sigma_{SUBST}^2)$,
$\zeta_{INV,t} \sim N(0, \sigma_{INV}^2)$.

Thus, fiscal impulses are independent. In particular, it means that there is no substitution between military government spending and non-military government spending.

3. The effects of military and non-military spending

The impact of a rise in military and non-military government spending on Polish economy was assessed on the basis of the theoretical model estimated for Poland. Bayesian estimation was used to estimate model parameters [Adolfson et al., 2007]. The a posteriori values of parameters were calculated on the basis of the Eurostat quarterly data for Polish economy. The sample covers the period of 2000–2021. The analysis is based on the following variables: GDP, consumption, employment and government spending.

As far as the aim of the research is concerned, the most important are the following parameters of the estimated model: substitution between consumption and non-military current government spending (γ) and public capital elasticity of output (α_{PUBL}). The prior means of these parameters ($\gamma = 0.23$, $\alpha_{PUBL} = 0.03$) were set on the basis of previous studies for developed economies (Heijdra, Ligthart [1997]; Hulten, Schwab [1993]). The higher the posterior mean of the parameter γ, the more significant the difference between crowding-out effect of military and non-military current government spending. Moreover, the higher the posterior mean of the parameter α_{PUBL}, the stronger the impact of non-military public investment on economic growth relative to the long-term effects of military spending. Thus, the posterior estimate of the parameter γ (0.3125) shows that in the Polish economy, substitution between non-military current government spending and consumption is relatively high. In turn, the posterior estimate of public capital elasticity of output (0.0296) indicates that the effectiveness of public capital in Poland is similar as in developed economies.

The effects of an increase by one percent of GDP of each analysed military and non-military government spending are presented in the study. The impulse-response functions show the changes in GDP and consumption defined as percentage points of the initial level of GDP.
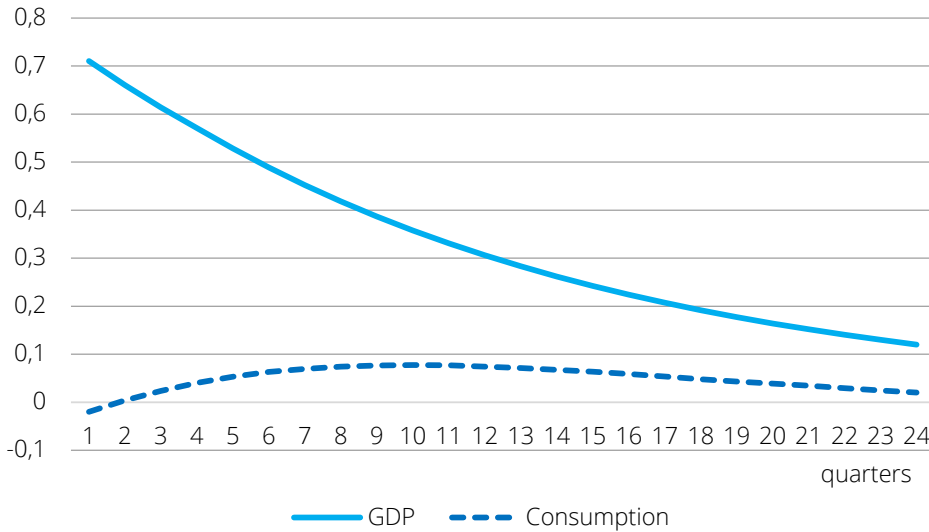
In the study, three kinds of government spending are distinguished:
– military spending,
– non-military current spending,
– non-military investment spending.

The economic effects of an increase in military government spending are shown in Chart 1.

Impact of increase in military government spending on GDP and consumption

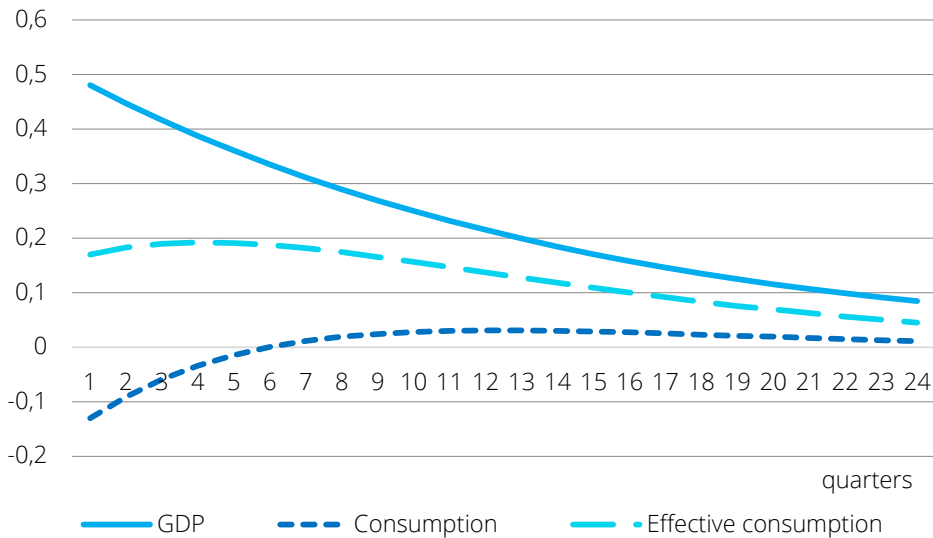Source: authors' own elaboration on the basis of Eurostat data.

The impulse response functions show that military spending significantly affects GDP. The military spending multiplier is initially about 0.7, which is only slightly lower than unity. The relatively high value of the multiplier is due to the fact that military spending is not a substitute for household consumption spending, and therefore consumption spending is not significantly reduced. Households aim to smooth consumption over time – so the crowding-out effect is small. As a result, the reduction in consumption directly after the increase in military spending is slight. Moreover, soon after an increase in government spending, there occurs a rise in consumption. This is because GDP and household income are boosted, which, in accordance with the consumption function, leads to an increase in household consumption. As can be seen from the impulse response function, in case of military spending this effect outweighs the crowding-out effect, which starts already in the second quarter.

At the same time, it can be noted that the changes caused by the increase in military government spending are temporary and they fade out over time. This is because military spending does not directly increase the productive capacity of the economy.

The effects of an increase in non-military government spending are shown in Chart 2 (current spending) and Chart 3 (public investment).

CHART 2

Impact of increase in non-military current government
spending on GDP and consumption

quarters

———— GDP   - - - - Consumption   ——— •Effective consumption

Source: authors' own elaboration on the basis of Eurostat data.

Current non-military government spending is partly a substitute for household consumption (as mentioned earlier – e.g. public and private education or public and private healthcare are partly substitutes). The result is that the multiplier is relatively low – it is lower than 0.5. This is due to the fact that as government spending increases, households are, to some extent, able to reduce consumption, since part of current government spending is partly a substitute for household spending. Thus, there is relatively lower growth in aggregate demand and GDP. Consequently, the combined negative effect on consumption resulting from crowding-out effect and substitution of private consumption for public consumption is stronger than the effect resulting from consumption function (the relationship between current income and private consumption) in 5 quarters. It is only in the 6th quarter that consumption increases slightly.

In case of current spending, it is important to distinguish between private consumption *sensu stricte* and effective consumption [Christiano, Eichenbaum, 1992], showing the impact of both private and public consumption on the utility of households (cf. equation (1)). For example, the level of utility of households is affected not only by private consumption regarding health care, but also to some extent by current public spending on health care.

Therefore, Chart 2 shows not only the formation of household consumption, but also the formation of effective consumption, taking into account the impact of public consumption on household utility. As can be seen in Chart 2, effective consumption is shaped well above the household consumption *sensu stricte*.

As in the case of military spending, the impact of current non-military government spending on GPD is temporary because, unlike public investment spending, it does not directly affect the productive capacity of the economy.

Contrary to current spending, the simulations show that the increase in non-military investment spending has a long-lasting impact on GDP. The impact on output is in this case relatively persistent, as the higher level of public investment leads to higher productive public capital.

What is more, short-term multiplier is also relatively high (higher than 0.7), because investment non-military spending is usually not a substitute for private consumption. Moreover, a rise in public investment increases consumption not only in the short run but also in the long run. Higher public investment leads to the increase in public capital which rises the production capacity and therefore has impact on household income and consumption.

CHART3

Impact of increase in non-military investment government
spending on GDP and consumption
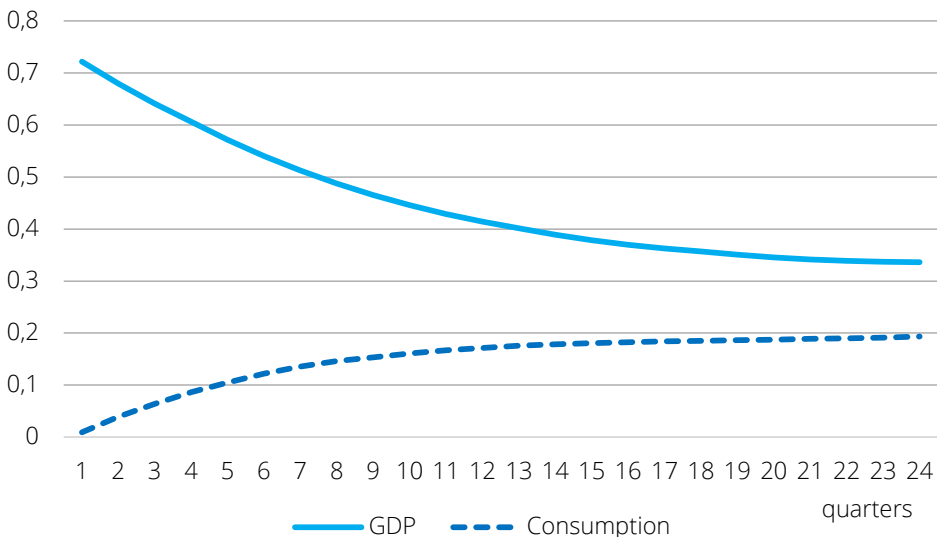
Source: authors' own elaboration on the basis of Eurostat data.

A comparison of the impact of military, non-military current and non-military investment government spending on GDP in the Polish economy is shown in Table 1 and Chart 4.

TABLE 1

Military spending, current non-military spending and investment non-military spending multipliers

Multiplier	Contemporary multiplier	Four-year aggregate multiplier
Military spending	0.71	1.71
Current non-military spending	0.48	1.18
Investment non-military spending	0.72	2.01

Source: authors' own elaboration on the basis of Eurostat data.

CHART 4

Comparison of military spending, current non-military spending and investment non-military spending impact on GDP
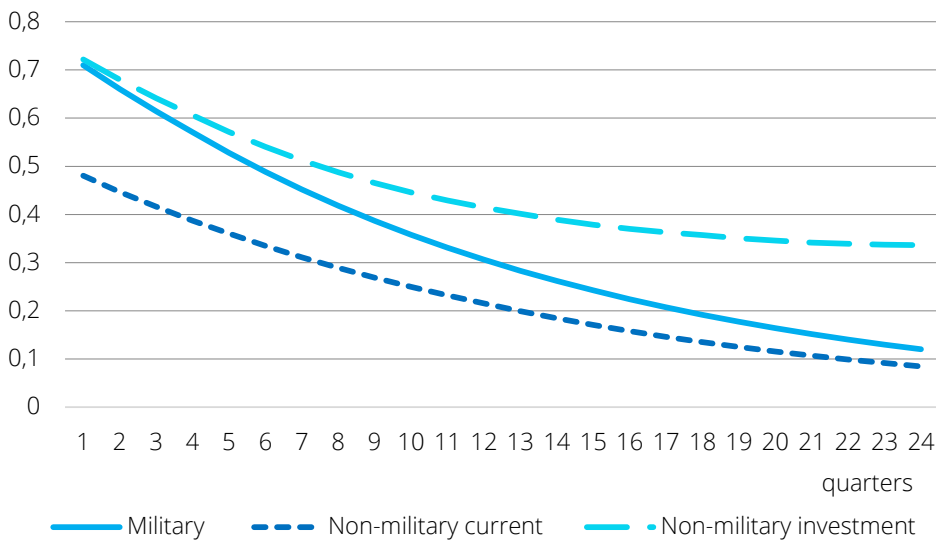
Source: authors' own elaboration on the basis of Eurostat data.

Two main conclusions emerge from this comparison:

– Military spending and non-military investment spending have stronger impact on GDP in the short term than non-military current spending. This is due to the fact that the increase in current non-military government spending causes to some extent reduction in the private consumption of households because of the substitution effect;

– Non-military investment spending affects GDP in the long run more significantly than military and non-military current spending. This is because non-military public investment affects the productive capacity of the economy and thus economic growth in the long run.

It is worth noticing that the impulse-response functions and fiscal multipliers are calculated under the assumption of the Ricardian equivalence, which may underestimate the impact of public debt on the rise in the interest rate and, consequently, on the decline in investment and GDP. If the assumption of the occurrence of Ricardian equivalence was eliminated, the obtained multipliers would be presumably lower. However, the negative effects of increase in government spending through the channel of higher public debt and interest rates is similar regardless of the type of the analyzed government spending. Therefore, the assumption of the occurrence of Ricardian equivalence does not have a significant impact on the relative differences between the fiscal multipliers for military and non-military government spending.

A comparison of the impact of military, non-military current and non-military investment government spending on effective consumption in the Polish economy is shown in Chart 5.

The effects of different categories of government spending on effective consumption (not on consumption *sensu stricte*) were analysed, since it is the effective consumption that affects the level of household utility. As indicated earlier, in the case of non-military current expenditure, the difference between *sensu stricte* consumption and effective consumption is particularly significant (whereas for military and investment spending, these differences are negligible).

The conclusions resulting from the comparison of the effects on effective consumption are as follows:

– In the short term, current non-military spending has the biggest impact on effective consumption. This is because it is the only one that affects effective consumption not only indirectly but also directly. Non-military current spending is the only type of public consumption that directly affects household utility;

– In the long term, non-military investment spending has the biggest effect on effective consumption. The reason for this is that it affects the production capacity of the economy, and therefore the income and consumption of households in the long run.

CHART 5

Comparison of military spending, current non-military spending and investment non-military spending impact on effective consumption
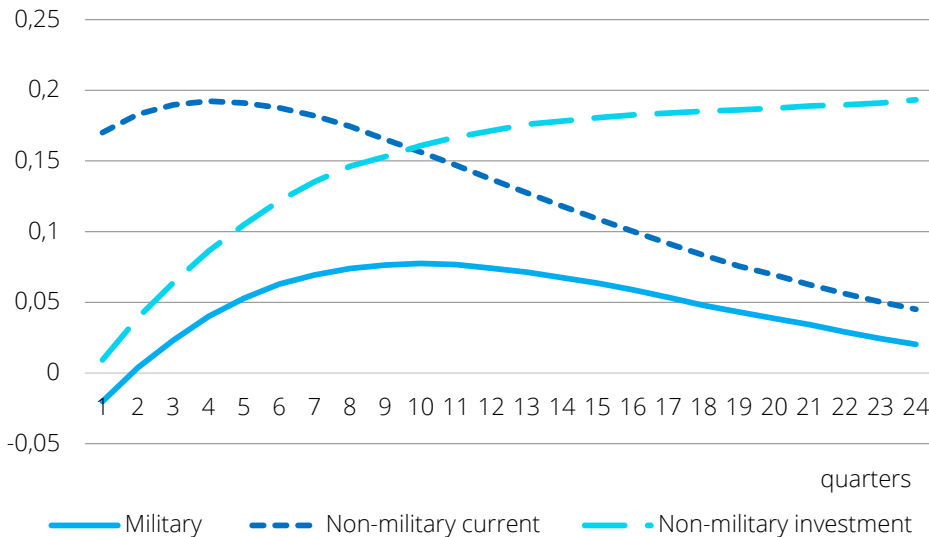
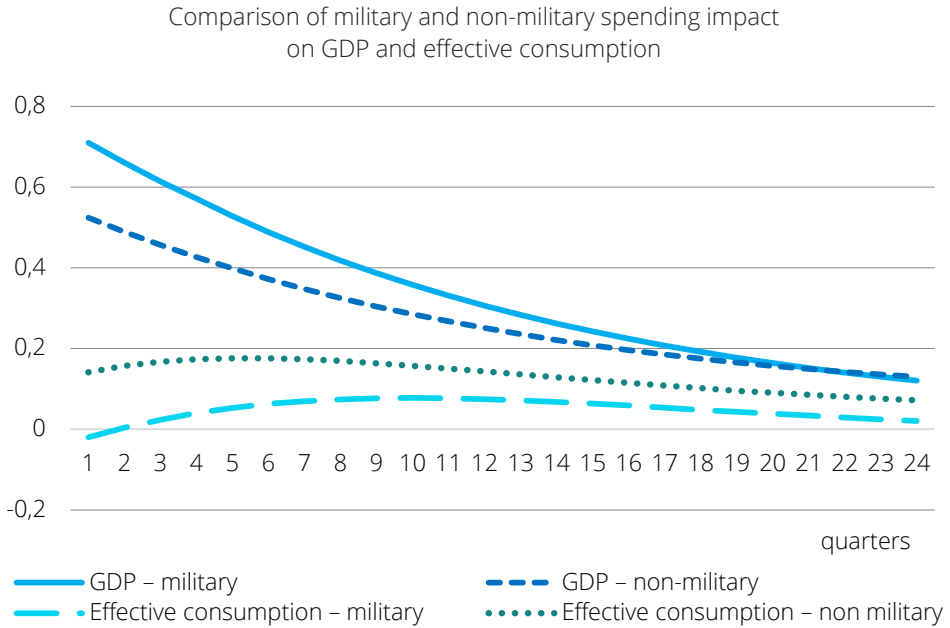Source: authors' own elaboration on the basis of Eurostat data.

The effects of the increase in military spending were also compared with the effects of the increase in total non-military spending (both current and investment). This comparison took into account the fact that current spending accounts for the vast majority of non-military spending in Poland, so the increase in total non-military spending mainly represents an increase in current spending.

A comparison of the effects of military and non-military government spending on the Polish economy is shown in Chart 6.

The main conclusion is that in the short to medium term, the more effective method of stimulating GDP in Poland is to increase military spending. It is only after about 5 years that the impact of military and non-military spending on GDP begins to be similar, when the dominant role begins to be played by the effects of non-military investment spending. At the same time, increasing non-military

spending is a better method of increasing effective consumption, and therefore the utility of households. This applies to the short, medium and long run.

CHART 6

Comparison of military and non-military spending impact
on GDP and effective consumption

Source: authors' own elaboration on the basis of Eurostat data.

5. Conclusions

The study presents the effects of military and non-military government spending on the Polish economy. The empirical results show that military spending significantly affects GDP in the short run. On the other hand, the impact of military spending on GDP is temporary and fades out over time. Results also indicate that non-military government spending impact on the GDP strongly depends on what category of non-military government expenditure is increased. The effects of current spending are in this case much weaker than the effects of investment spending – both in the short and the long run.

The study examines the impact of military and non-military spending not only on GDP but also on consumption, including effective consumption, which is relevant to the level of household utility. A detailed comparison of the effects of different types of government spending in Poland shows that:

– in the short run, military spending and non-military spending investment have a greater impact on GDP than non-military current spending, whereas in the long run non-military investment spending affects GDP most significantly,

– in the short run, current non-military spending has the greatest impact on effective consumption, whereas in the long term this impact is the strongest in the case of non-military investment spending.

Moreover, a comparison of the effects of military spending and total non-military spending shows that in Polish economy:

– on the one hand, in the short to medium term, rising military spending is a more effective method of stimulating GDP,

– on the other hand, increasing non-military government spending is a more effective method of enhancing effective consumption and thus household utility.

This means that there is a trade-off between efficiency in stimulating GDP and effective consumption. Military government spending is a better fiscal policy tool in the case of stimulating GDP, but not the effective consumption, whereas non-military government spending is a good tool of increasing the effective consumption rather than GDP.

References

Adolfson M., Laseen S., Linde J., Villani M., 2007, *Bayesian estimation of an open economy DSGE model with incomplete pass-through*, "Journal of International Economics", Vol. 72(2), pp. 481–511, DOI: 10.1016/j.jinteco.2007.01.003.

Afonso A., Baxa J., Slavik M., 2018, *Fiscal Developments and Financial Stress: A Threshold VAR Analysis*, "Empirical Economics", Vol. 54(2), pp. 395–423, DOI: 10.1007/s00181-016-1210-5.

Atesoglu H.S., Mueller M.J., 1990, *Defence Spending and Economic Growth*, "Defence Economics", Vol. 2(1), pp. 19–27, DOI: 10.1080/10430719008404675.

Becerra-Vicario, R., Alaminos D., Cisneros-Ruiz A., Solano S., Miguel A., 2020, *Estimating Optimal Military Spending Policy in DSGE Model: Empirical vs Theoretical Approach*, "Journal of Scientific and Industrial Research", Vol. 79, pp. 193–196, DOI: 10.56042/jsir.v79i3.68635.

Barro R., 1974, *Are Government Bonds Net Wealth?*, "Journal of Political Economy", Vol. 82(6), pp. 1095–1117, DOI: 10.1086/260266.

Brumm H.J., 1997, *Military Spending, Government Disarray, and Economic Growth: A Cross-country Empirical Analysis*, "Journal of Macroeconomics", Vol. 19(4), pp. 827–838, DOI: 10.1016/S0164-0704(97)00044-X.

Calvo G.A., 1983, *Staggered Prices in a Utility-Maximizing Framework*, "Journal of Monetary Economics", Vol. 12(3), pp. 383–398, DOI: 10.1016/0304-3932(83) 90060-0.

Carter J., Ondercin H.L., Palmer G., 2021, *Guns, Butter, and Growth: The Consequences of Military Spending Reconsidered*, "Political Research Quarterly", Vol. 74(1), pp. 148–165, DOI: 10.1177/1065912919890417.

Chen P.F., Lee C.C., Chiu Y.B., 2014, *The Nexus between Defense Expenditure and Economic Growth: New Global Evidence*, "Economic Modelling", Vol. 36(C), pp. 474–483, DOI: 10.1016/j.econmod.2013.10.019.

Christiano L.J., Eichenbaum M., 1992, *Current Real Business Cycle Theory and Aggregate Labor Market Fluctuations*, "American Economic Review", Vol. 82(3), pp. 430–450, DOI: jstor.org/stable/i337064.

Compton R., Paterson B., 2016, *Military Spending and Growth: The Role of Institutions*, "Defence and Peace Economics", Vol. 27(3), pp. 301–322, DOI: 10.1080/10242 694.2015.1060022.

d'Agostino G., Dunne J.P., Pieroni L., 2012, *Assessing the Effects of Military Expenditure on Growth*, [in:] *The Oxford Handbook of the Economics of Peace and Conflict*, Garfinkel M.R., Skaperdas S. (eds.), Oxford University Press, Oxford.

Dunne J.P., Tian N., 2013, *Military Expenditure and Economic Growth: A survey*, "The Economics of Peace and Security Journal", Vol. 8(1), DOI: 10.15355/epsj.8.1.5.

Dunne J.P., Tian N., 2015, *Military Expenditure, Economic Growth and Heterogeneity*, "Defence and Peace Economics", Vol. 26(1), pp. 15–31, DOI: 10.1080/10242694. 2013.848575.

Erceg Ch.J., Henderson D.W., Levin A.T., 2000, *Optimal monetary policy with staggered wage and price contracts*, "Journal of Monetary Economics", Vol. 46(2), pp. 281–313, DOI: 10.1016/S0304-3932(00)00028-3.

Ercolani V., e Azevedo J.V., 2014, *The effects of public spending externalities*, "Journal of Economic Dynamics and Control", Vol. 46(C), pp. 173–199, DOI: 10.1016/j. jedc.2014.06.016.

Galí J., López-Salido J.D, Vallés J., 2004, *Rule-of-Thumb Consumers and the Design of Interest Rate Rules*, "Journal of Money, Credit and Banking", Vol. 36(4), pp. 739–764, DOI: 10.1353/mcb.2004.0064.

Heijdra B., Ligthart J.E., 1997, *Keynesian Mulitpliers, Direct, Crowding Out, and the Optimal Provision of Public Goods*, "Journal of Macroeconomics", Vol. 19(4), pp. 803–826, DOI: 10.1016/S0164-0704(97)00043-8.

Hulten C., Schwab R., 1993, *Public Capital Formation and the Growth of Regional Manufacturing Industries*, "National Tax Journal", Vol. 46(3), pp. 261–273, DOI: 10.1086/ NTJ41789019.

Hung-Pin L., Wang T.-L., 2022, *Does Military Expenditure Promote Economic Growth and Social Welfare? Theoretical and Empirical Evidence in Taiwan*, "Economic Computation and Economic Cybernetics Studies and Research", Vol. 56(2), DOI: 10.24818/18423264/56.2.22.05.

Kamps Ch., 2004, *The Dynamic Macroeconomic Effects of Public Capital: Theory and Evidence for OECD Countries*, Springer, Berlin.

Karamanis D., 2022, *Defence Partnerships, Military Expenditure, Investment, and Economic Growth: An Analysis in Pesco Countries*, "Hellenic Observatory Discussion Papers", No. 173, London School of Economics and Political Science.

Karras G., 1994, *Government Spending and Private Consumption: Some International Evidence*, "Journal of Money, Credit and Banking", Vol. 26(1), pp. 9–22, DOI: 10.2307/2078031.

Kollmann R., 2001, *The Exchange Rate in a Dynamic-Optimizing Business Cycle Model with Nominal Rigidities: A Quantitative Investigation*, "Journal of International Economics", Vol. 55(2), pp. 243–262, DOI: 10.1016/S0022-1996(01)00087-3.

Kwan Y.K., 2006, *The Direct Substitution Between Government and Private Consumption in East Asia*, "NBER Working Papers", No. 12431, National Bureau of Economic Research, Cambridge, MA.

Lobont O.R., Glont O.R., Badea L., Vatavu S., 2019, *Correlation of Military Expenditures and Economic Growth: Lessons for Romania*, "Quality & Quantity", Vol. 53, pp. 2957–2968, DOI: 10.1007/s11135-019-00910-9.

Lorusso M., Pieroni L., 2017, *The Effects of Military and Non-Military Government Expenditures on Private Consumption*, "Journal of Peace Research", Vol. 54(3), pp. 442–456, DOI: 10.1177/0022343316687017.

Mohanty R.K., Panda S., Bhuyan B., 2020, *Does Defence Spending and Its Composition Affect Economic Growth in India?*, "Margin: The Journal of Applied Economic Research", Vol. 14(1), pp. 62–85, DOI: 10.1177/0973801019886486.

Taylor J.B., 1993, *Discretion versus policy rules in practice*, "Carnegie-Rochester Conference Series on Public Policy", Vol. 39(1), pp. 195–214, DOI: 10.1016/0167-2231(93)90009-L.