

Defence Spending and Economic Growth in the Visegrad Countries

Grzegorz Waszkiewicz

Military University of Technology, Warsaw, Poland

e-mail: gwaszk@gmail.com

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Abstract

This paper aims to consider the impact of military outlays on economic stance in several states in Central Europe. Therefore, we attempted to search the long- and short-range causality between defence spending and economic growth in the Visegrad countries through analysing general values (total spending approach), as well as outlay distribution in the defence sector (spending division approach). To do so, we first presented the theoretical aspect of the problem, as well as the trends in military spending of the considered states since 1993. Second, we reviewed international results of empirical examinations in this area. Then we examined causalities among variables on the grounds of VAR methodology.

We did not validate the long-term causality between defence spending and economic growth in the Visegrad countries. Nonetheless, we confirmed several short-term relationships in both empirical approaches.

JEL Codes: E62, H60, F52, C22

Keywords: military expenditure, distribution, economic development, causality, cointegration

Introduction

The role of military spending seems to grow as a result of security-related threats around the world. For Central European countries, their need for increased military outlay results predominantly from concerns about European Union security. First, armed conflict between Ukraine and Russia rose political uncertainty within neighbouring post-communist states (Long-term 2014). Second, new threats, such as Brexit and unbalanced migration policies in Europe, have forced governments from the Visegrad countries (V4) to spend more on defence (Joint Statement 2016). In addition, all V4 are NATO members and they are obliged to fulfil permanent requirements when it comes to military financing. Considering the above-mentioned needs for growing budgetary expenses on defence in the V4, an interesting point may be an examination of whether military expenses influence national economic growth, especially when most European states are compelled to restore the pace of economic development after the last financial crisis.

The question of causalities between military spending and gross domestic product (GDP) is rarely undertaken in regard to states from Central Europe, such as the V4. Moreover, the great amount of verifications refers to the relations between the aggregate value of military spending and GDP (total spending approach). To develop that line, the presented article attempts to find not only connections between aggregate defence expenses and GDP, but also how capital distribution among four areas (equipment, infrastructure, personnel, and other) affects economic growth (spending division approach).

Our research encompasses theoretical, statistical, and empirical aspects. First, we show how, in theory, defence expenses and their distribution may influence national economic development. Second, we present the trends of military spending in V4 since 1993. Third, we concisely review the results of empirical verifications conducted on European economies, especially on the V4. Finally, we employ VECM procedure and Granger causality tests to draw conclusions.

Defence outlays and economic growth – insight into the theory

National spending on defence may affect the real sphere of the economy through three channels: supply, demand, and national security (Awaworyi & Yew 2014).

The demand channel emanates from the Keynesian approach and supports proactive state using military spending (as a short-term stimulant) to increase output in times of low aggregate demand and unemployment. However, abundant military expenses can lead to the development of ineffective industries or powerful pressure groups (Dune and Uye 2009). It is believed that greater government expenditure leads to better capital allocation, which causes additional profits, lower interests rates, and stimulated production and economic growth. Although Robert J. Barro and Charles J. Redlick (2009) evaluated this temporary multiplier effect as 0.4-0.5, permanent and positive trends in defence spending can extend maximally by 0.2.

The classical school maintains that defence expenses are likely to weaken economic growth. Additionally, military outlay causes a low level of private investment and domestic savings, finally hampering consumption because of reduced aggregate demand. The supply channel is related to the neoliberal school of thought, by which national defence is treated as a public good that generates opportunity costs. It considers and measures those costs through crowding out private investments in the economy (inflation), imbalanced international financial position owing to equipment procurement,

and other macroeconomic indicators (e.g. excessive public debt). If economic profit prevails opportunity costs, defence spending has a positive bearing on growth (the long-term effects). The supply channel suggests some vital ways of affecting GDP as a result of the development of infrastructure, as well as procurements and modernizing equipment which, in turn, may bring positive externalities for arms and neighbouring industries. New technology and international cooperation also contribute to providing soldiers and civilian workers with valuable technical and administrative skills, highly priced on the free market. On the other hand, keeping stable financing in case of low budgetary revenue is tantamount to limitations in other sectors. A typical example is public education, research, or state infrastructure, where investments also create long-term economic development.

On the other hand, it is not a good solution to take the only criterion for productivity in times of growing global insecurity, as military expenditure impacts the national economy also through the security channel. A well-financed army provides a sense of security in society. The security of citizens, in turn, should foster savings, investments, and production in the economy (Thompson 1974). According to Roland P. Smith (2000), when economic determinants of growth are unchanged but political instability (security threats) is growing, a negative relationship between military expenditure and GDP will be noted. On the contrary, if political instability is constant, and economic variables are changing, the positive impact of military outlay on economic growth is noticeable. Thus, considering the need for limiting opportunity costs, as well as providing a secure environment at the same time, the key point is a source of money. If higher costs are covered by additional taxes, it may reduce the inclination to save in the economy in the future. When indispensable funds come from increasing the monetary base, this will cause inflation. Additional defence costs should not be financed through issuing public debt, especially foreign public debt because it weakens the national economy on international financial markets, as well as generates financial crisis when debts are covered by foreign exchange reserves.

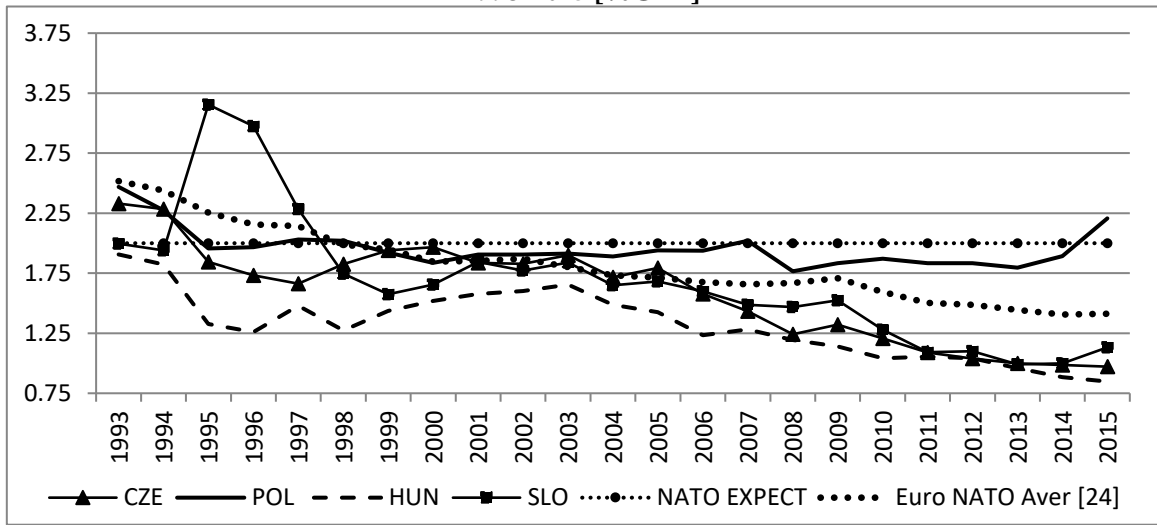
Endogenous growth theories suggest that government expenditures foster economic growth in the long-term. However, the positive influence is dependent not only on the size of budgetary outlay, but also on different components of spending (distribution of funds). Therefore, an increase in non-productive expenses within the defence sector is usually accompanied by reduced growth (Pieroni 2009). On the grounds of neoliberal and economic growth theories, global military neoliberalism is presently gaining momentum as a dominant approach (Cypher 2007). That vision puts forward the mangling of different ways of affecting national economies with the pressure on long-term results. The key changes concern the job market, accessibility of capital and new technologies, external relations, the scale of public and private debt, and prevention of international conflicts and social unrest (Dunne and Uye, 2009).

Regardless that the above-mentioned theoretical approaches put pressure on distant aspects of defence spending for building national well-being, the key economic decisions pertain to the military expenditure division as financing particular components affects various engines of economic growth in the national economy. The first issue seems to be personnel costs, which certainly contribute to aggregate demand in the economy. Nevertheless, the question is to what extent economic development is based on internal consumption. High personnel expenses may support investments provided that society prefers savings than consumption. Generally, money from wages and pensions to cover current needs may boost national demand. Expenses on workforce training, acquiring equipment and technology, as well as scientific innovations within weaponry are more productive in the long run than expenditure on wages. Infrastructure outlay concerning alliance and national construction aid long-term economic development provided that the new buildings, bridges, airports etc. serve soldiers, as well as civilians. According to NATO nomenclature (Defence 2015), other needs pertain to costs of operation and maintenance, spending on less-significant research, as well as expenditure not classified within the three main categories. Certainly, their hazy nature puts these outlays in question, as they may be employed to finance hidden priorities. Therefore, this component may slightly affect economic development.

Defence expenditure in V4

The end of the Cold War triggered the process of reducing military spending worldwide. Although most European countries limited their military outlay (Topcu and Aras 2017), the contemporary geopolitical situation in Europe did not disburden several post-communist states with regional military pressure in full measure. Thus, they were obliged to work intensively towards being a part of NATO. Slovakia is a typical example. In 1993, Slovakia's military expenditure was the lowest in the group of analysed countries and its government wanted to be on par with the country's closest neighbours, especially on the eve of anticipated NATO enlargement in 1999. For this reason, Slovakia increased military outlays in the '90s, although such policy consumed a large share of national wealth (1995-1997 - figures 1 and 2). After NATO entry, allies are expected to fulfil the 2% GDP criterion on national defence. In fact, besides Poland before the last crisis, none of V4 met that challenge. Moreover, trends in military outlay are definitely below the average of the 24 European NATO members (all European allies except Luxemburg and Iceland). Total expenditure in the defence sector varied greatly among analysed economies, as presented in Figure 1 and Table 1. Poland spends the most, whereas the scale of defence financing in Hungary is the lowest in the V4.

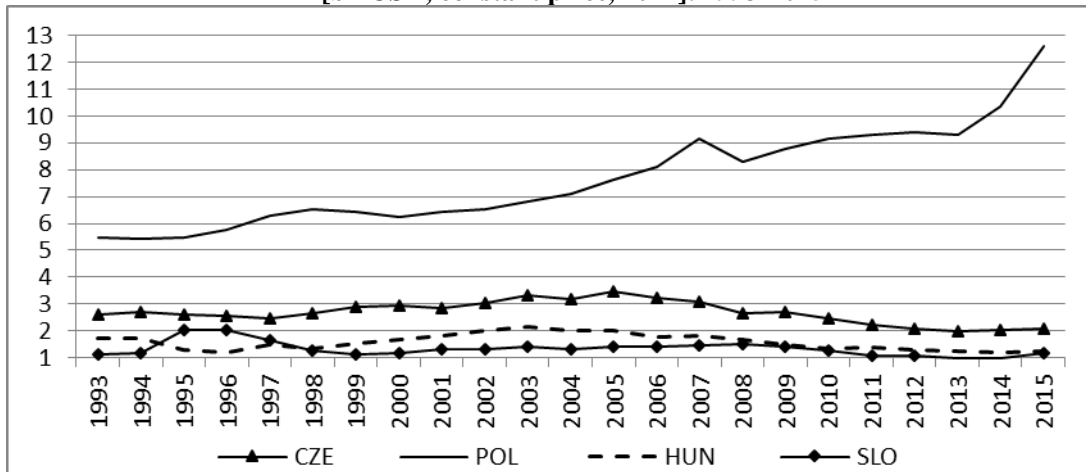
**Figure 1. Average of defence spending within European NATO countries:
1993-2015 [%GDP]**



Source: Own elaboration on the basis of SIPRI statistics.

We can observe that Poland had two times larger defence budget than the rest of the Visegrad countries in 2012 and 2013 (Figure 2). In addition, trends in all countries, besides Poland, prove a decrease in total outlays on defence, as well as reduced share in all budgetary costs after the crisis (Figure 3).

**Figure 2. Total expenditures on defence in V4
[bn USD, constant price, 2014]: 1993-2015**



Source: Own elaboration on the basis on the basis of SIPRI statistics.

The second point of aggregate spending on defence refers to its stability. The economic and financial crisis shook the global economy and triggered illiquidity on financial markets and in real economies. National governments, as well as international authorities from the European Union, tried to support particular economies using stimulus packages and unconventional monetary policies. Those measures led to an unexpected growth of sovereign debt. Over time, the situation started to stabilise. However, huge public debt remained. The way out was to balance the budgets by confining budgetary spending. Governments had to transfer money into social programs and invigorate national economies at the cost of expenses on defence.

The scale of deviation within defence expenses is connected with their volume (Table 1). At first glance, the higher outlay, the bigger instability. However, when we measure the quotient of standard deviation and total

expenditures, it is easily noticeable that relative stability is presented by the Czech Republic (0.006), whereas there is the highest uncertainty in Poland (0.104).

Table 1. Descriptive statistic of total expenses in V4: 1993-2015

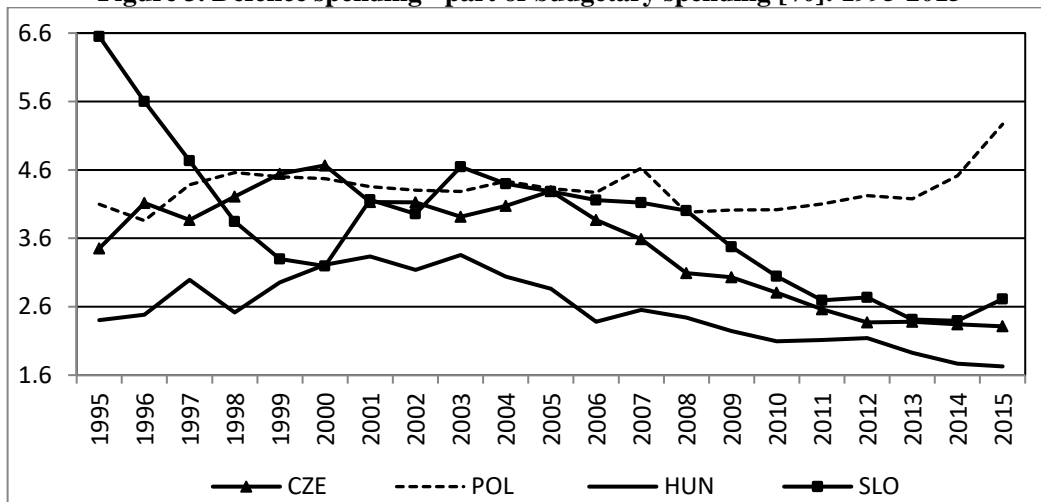
<i>Country</i> <i>Statistics</i>	DSCZE	DSPOL	DSHUN	DSSLO
Mean	2685.745	7681.103	1581.423	1329.585
Median	2650.340	7117.201	1516.217	1304.327
Maximum	3470.176	12603.22	2166.229	2043.388
Minimum	1970.505	5446.753	1207.799	966.4510
Std. Dev.	425.7140	1843.748	298.6963	280.5980
Kurtosis	2.156873	3.181687	1.863607	4.260040
Sum	61772.14	176665.4	36372.73	30580.45
Obs.	23	23	23	23

Source: Own calculations on the basis on the basis of SIPRI statistics.

Threats to national security (terrorism, violence, and conflicts) epitomize political instability that affects budgetary expenditures on defence. Comprehending national security as a defence-spending determinant gained momentum along with the growth of outlay on ITC technology worldwide and the appearance of international terrorism after 2001. The significance of security in national economic policy may be evaluated through the share of military outlays in all budgetary costs. That gauge allows for concluding whether governments treat national security as a main or secondary priority. If national authorities perceive security dangers as inconsiderable, they are often prone to use the defence expenses to balance budgetary bills.

Among V4, the role of the military sector in fiscal expenditures is the most important in Poland. This suggests that Poland is still concerned about foreign threats and, therefore, enhances its national defence sector (arms industry). In fact, Europe was the safest part of the world in 2012, as well as in 2015, according to the Global Peace Index (2012; 2015). These years coincide with when there was a need for limiting national budgetary expenses in the aftermath of the crisis. Finally, two (economic and political) out of three main factors responsible for the value of defence expenditure (Waszkiewicz 2016) let governments curb defence costs across V4.

Figure 3. Defence spending - part of budgetary spending [%]: 1995-2015

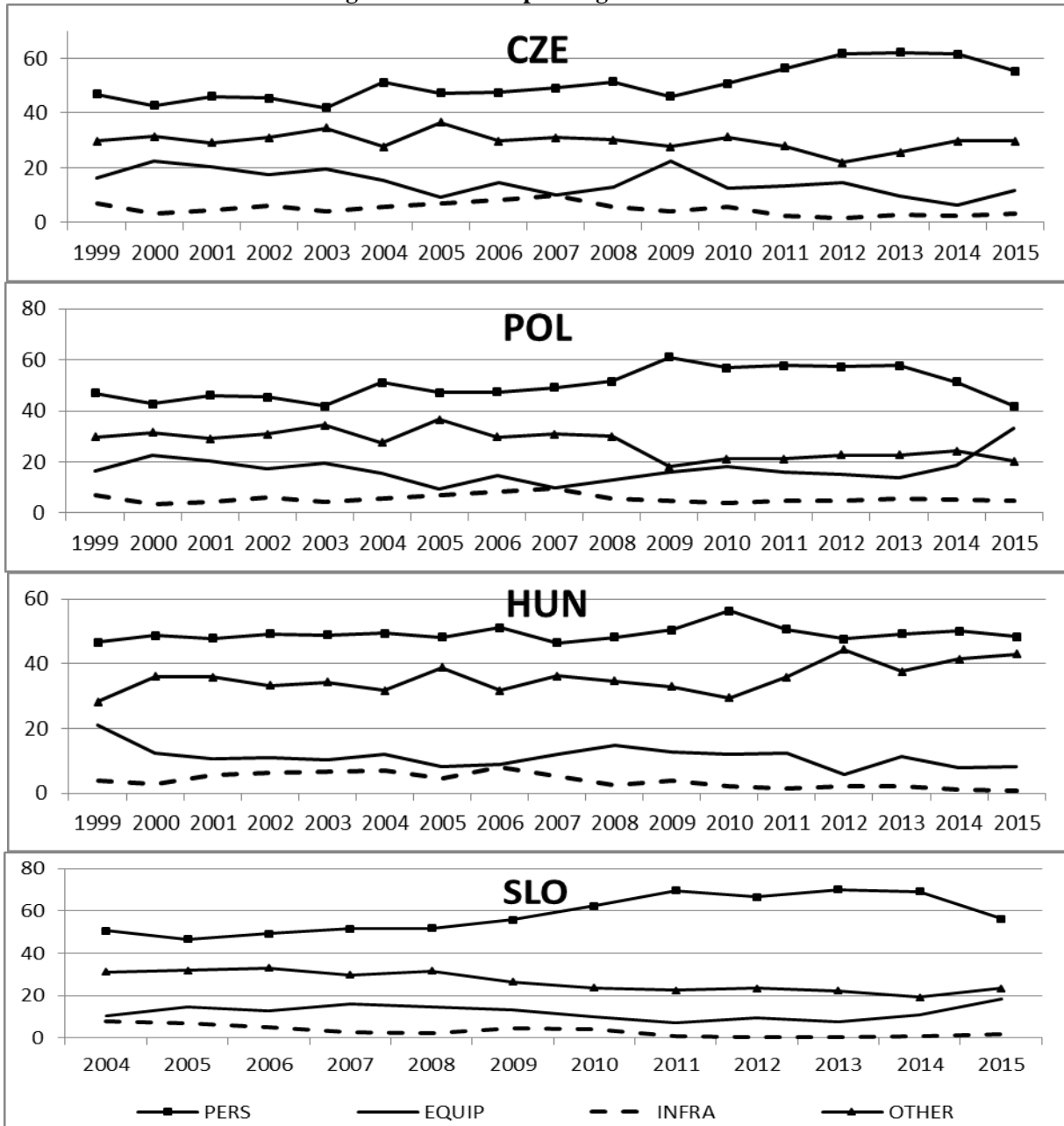


Source: Own elaboration on the basis on the basis of SIPRI statistics.

The real priorities of national authorities concerning security provision seem to be less hazy if we look at the division of outlay within national defence sectors across V4 (Figure 4). Analysed economies divided funds on defence taking into consideration personnel (PERS), equipment (EQUIP), infrastructure (INFRA), or other (OTH) needs, which include operation and maintenance, other R&D expenses, and outlay not allocated to the above-mentioned categories (Defence 2015). The typical pattern among V4 shows that personnel and other costs are dominant and amount to 80% of total spending in Hungary (86.2%), Slovakia (85.6%), and the Czech Republic (82.5%). The only economy where a

share of those categories is below 80% is Poland (78.8%). Other expenditure is a crucial category, especially in Hungary and in the Czech Republic. According to Tomáš Daněk (2015), economic conditions in countries with small armies do not allow for reducing the number of personnel in order to protect equipment outlay during a recession. Finally, the overall budgetary expenditure on defence decreased whereas mandatory spending rose because of the percentage growth of personnel costs.

Figure 4. Defence spending division: 1999*-2015



Source: Own elaboration on the basis of NATO statistics.

* Data for SLO start in 2004 because SLO joined the alliance that year.

Considering the last decade, it could be underlined that regional (European) factors contributed greatly to lowering the stability of defence outlays in V4 because Europe is the most peaceful region in the world. However, the negative tendencies from 2008-2013 are now reverting to grand values because of growing political peril (e. g., terrorism, migration, and defragmentation of the EU) and armed conflicts within Europe (Ukraine and Turkey).

Concerning stimulating economic growth, the first aspect is the value of funds transferring from the national budget to the defence sector. In this area, some analysed countries are far away from NATO's requirement. The second issue, however, is the pattern of distribution of those funds within the defence sector. Unexpectedly, all V4 have a similar pattern concerning the distribution of money within their armies.

A short review of previous tests on European countries

Depending on the applied method, the length of the time series, and the selected countries, the obtained results suggest existing causality (positive or negative), as well as a lack of interconnection. No influence was confirmed in tests conducted by Christos Kollias et al. (2004) who examined European countries (EU-15; 1961-2000) and proved that military expenses are unproductive. Moreover, Paul J. Dunne and Eftychia Nikolaidou (2011) also did not find any dependencies between defence expenditures and GDP based on the UE-15 economies (in 1961-2000). A positive relationship was supported by Christos Kollias (1995) and Paul J. Dunne et al. (2001) concerning one economy—the Greece economy. When it comes to greater probing, Christos Kollias et al. (2007) used the same observations as in 2004 but with different methods. They concluded there is bi-directional dependency between expenses and growth in the long run. Contrary to that, Roland P. Smith (1980) found that GDP is negatively influenced by military expenses in advanced economies through its adverse impact on investment. Hsin-Chen Chang et al. (2011), by analysing 90 economies from around the world from 1992-2006, including all Eurozone countries, proved adverse relations between defence expenses and economic growth. Moreover, Suna Korkmaz (2015) scrutinizing France, Spain, Greece and Italy (2005-2012) stated that defence outlays reduce economic development.

Empirical examinations of the analysed problem only towards economies from Central Europe are rare. When we try to abstract Central European countries from the wide range of analysed states, we can find more results. Mert Topcu and Ilhan Aras (2015) looked for the long-term causality in European countries with a distant level of well-being. In terms of economically weaker states (e.g. Poland, Hungary), they did not prove positive causality from defence spending to GDP. Analysing Central and Eastern European countries (all V4 therein) from 1993-2013, they upheld the same conclusions two years later (Topcu and Aras 2017). T. Daněk (2015) also analysed 28 European countries including Poland, the Czech Republic, and Hungary. He divided all scrutinized economies on resource-abundant and resource-constrained countries. This examination, encompassing 22 annual observations, vindicated the lack of military expenditures' impact on GDP in poorer states, such as the V4. According to Daněk (2015), military expenditure tends to have a positive impact on economic growth in rich economies whereas, in resource-constrained states, defence expenses crowd out more productive investments and hamper GDP growth. Similar conclusions were provided by Gitana Dudzeviciute et al. (2016) who considered short-range relations. She analysed numerous European states, dividing them into five groups because of national wealth. Basing on the limited number of observations (9 obs.) she confirmed no causality in the V4 (low-income states).

The short review of empirical tests allows us to draw crucial conclusions. Firstly, all mentioned tests present total expenditure approach. Secondly, there is a shortage of empirical tests dedicated only to economies from Central Europe. Thirdly, unlike in wealthy European countries, results from empirical examinations of Central European economies are rather reliable and consistent in terms of long-term causality from military expenditure to economic growth. They reject such a relationship.

Empirical aspect

Data and method

Statistical data concerns the Czech Republic (CZE), Poland (POL), Hungary (HUN), and Slovakia (SLO). It encompasses GDP (from World Bank statistics: expressed as constant prices 2010, USD per capita), military expenditures (from SIPRI statistics: expressed as constant prices 2014, millions USD). The linear trends of GDP and military expenditure are presented in appendix 1 and 2. The percentage division of defence spending was divided into four components, according to NATO nomenclature (% of total outlays). We employed VECM approach and Granger causality tests. The verifications were conducted in two stages. In the first stage, statistical data referred to 1993-2015 for all analysed economies. In the second stage, we applied NATO data on the percentage division of military expenses, which is gathered since the particular state joins alliance. Therefore, statistics for CZE, POL, and HUN encompass 1999-2015 whereas data for SLO cover 2004-2014.

Stage 1: Total Spending Approach (TSA)

In the first stage, we wanted to examine whether general defence spending impacts economic growth (total spending approach) in the analysed economies. Firstly, we checked the stationarity of the time series to rule out the presence of spurious regression. Based on AIC criteria, we analysed critical values for an augmented Dickey-Fuller test (ADF) and asymptotic critical values suggested by James MacKinnon (1996). Only models with constant or constant and trend where critical values are satisfying and, simultaneously, asymptotic values were less than 0.05 considered. Results from conducted tests (Appendix 1; 2; 3; Table 1) were used to confirm the stationarity of all EXP and GDP series.

For CZE, HUN, and POL, we attempted to verify the long-term dependency on the grounds of a vector error correction mechanism, as both DS and GDP are not stationary on their original levels. Applying Søren Johansen's (1988) procedure, we searched for a stationary cointegration vector of two non-stationary series. Finally, the VECM conditions were not fulfilled (Appendix 3; Table 2), so we considered only short-term causalities towards all countries. Based on the results from Appendix 3, Table 1, we used a VAR model with the following input series:

:

CZE	D(DS) → DD(GDP)
HUN	D(DS) → DD(GDP)
POL	DD(DS) → DD(GDP)
SLO	DS → D(GDP)

We applied models with one lag order, and then, models with two lags order to examine whether the number of lags impacts causality between variables. At the beginning, we estimated parameters of the two models for each economy. The parameters for models with one lag are presented in Table 1.

Table 1. VAR models

Model Economy	GDP = X ₁ EXP ₍₋₁₎ + X ₂ GDP ₍₋₁₎ + C			
CZE	1 lag	1.71	-0.17	59.2
POL		0.09	-0.15	4,89
HUN		0.25	-0.40	26,7
SLO		0.13	0.15	0.03

Source: Own calculations in Eviews.

All models were rendered stable without autocorrelation (Appendix 3; Table 3). Then, we carried out Granger causality tests, Wald variant (Table 2) based on estimated VAR models.

Table 2. Granger Causality Test - results

Impact Economy	EXP → GDP	
	<i>p</i> value	H ₀ : EXP does not cause GDP
	LAG: 1	
CZE	0.012**	Reject
POL	0.235	Not reject
HUN	0.606	Not reject
SLO	0.699	Not reject
	LAGS:1-2	
CZE	0.020**	Reject
POL	0.167	Not reject
HUN	0.682	Not reject
SLO	0.761	Not reject

Source: Own calculations in Eviews. Note: Significance level: ** 5%.

The employed models only entitled us to verify short-range causalities. According to the achieved results, there is short-term impact of DS on GDP in CZE regardless of the number of used lags. For POL, HUN, and SLO, the short-term causalities were definitely rejected in both models with various lag order.

Stage 2: Spending Division Approach (SDA)

In this stage, we strained to verify whether spending division approach provides additional information that may top up conclusions from the total spending approach. We were not able to examine the long-term impact because of an insufficient number of observations.

We were interested in the joint impact of personnel, infrastructure, equipment, and other defence spending on GDP. We wanted to verify individual influence of those categories on economic growth, as well as their mutual connections. The share of a particular category was presented as a product of percentage significance and total value for that year. The only weakness of our transformation is the fact that we mixed data from NATO and SIPRI. However, neither of those institutions provides data adequate for this concept. Nonetheless, there is no great discrepancy between NATO and SIPRI in counting military expenditure.

Firstly, we checked the stationarity of variables according to procedures applied at the first stage (critical and asymptotic values). Models with constant or constant with trend, including the first and second difference, were considered. Because of the short time range of data, we examined only 1 lag order. The final results (asymptotic critical values) of the conducted tests are presented in Appendix 3; Table 4. We did not confirm the stationarity of EQUIP in Poland. For SLO, we were unable to eliminate the unit root for the GDP, OTH, and PERS time series. Thus, we carried on without Slovakia and with three independent variables for Poland (Table 3).

Table 3. VAR models

Model Economy	GDP = X ₁ INF ₍₋₁₎ + X ₂ OTH ₍₋₁₎ + X ₃ PERS ₍₋₁₎ + X ₄ EQUIP ₍₋₁₎ + X ₅ GDP ₍₋₁₎ + C					
CZE	0.42	0.95	0.50	0.42	-0.39	-118.4
POL	0.38	-0.14	-0.29		-0.03	85,6
HUN	2.72	0.03	0.74	-2.80	-0.32	-6,93

Source: Own calculations in Eviews.

Because of the short range of statistics, we could not check autocorrelation. However, we confirmed the stability of all models based on unit roots cycle. On these grounds, we applied a Granger causality test, Wald version (Table 4).

Table 4. Granger Causality Test – results

Economy	Impact	INF+OTH+PERS+EQUIP→GDP	
		Component	(pvalue)
CZE	All		0.401
POL	All		0.791
HUN	All		0.834
H ₀ : ... does not cause GDP			
Not reject			

Source: Own calculations in Eviews. Note: For Poland (INF+OTH+PERS→GDP)

Although the combined influence of all components on GDP was not confirmed in any country, we observed there may exist short-term inter-component relations, which are shown in Table 5.

Table 5. Inter-components short run impact - results

Model Economy	Impact	(pvalue)
CZE	EQUIP → PERS	0.029**
POL	All → OTH	0.000***
	INF → OTH	0.000***
	All → PERS	0.050**
HUN	All → INF	0.016**
	OTH → INF	0.008***
	All → OTH	0.003***
	GDP → OTH	0.002***

Note: Omitted components turned out to be statistically insignificant. Significance level: *** 1%; ** 5%. Own calculations in Eviews.

Considering the joint impact of all components, we could not confirm a causal link from defence outlay to GDP in V4. Nonetheless, we noticed that other outlay (in case of POL and HUN) and infrastructure expenditure in HUN are dependent on all categories together. Certain inter-component relations were proven for CZE, POL and HUN. Unfortunately, we could not examine any connections among sub-components in SLO.

Summary of tests – discussion

Examining defence expenditures' impact on GDP based on VAR models, we rejected the possibility of any long-range causality within the Visegrad countries. This is in line with international empirical findings from recent years (Daněk 2015; Topcu & Aras 2015; Topcu & Aras 2017).

Taking the short-term perspective into consideration, we proved strong causality in the Czech economy. The rest of the examined economies did not experience causality between defence outlay and economic growth. In contrast to Dudzeviciute et al. (2016), our study, encompassing a significantly larger sample of observations, proved one strong causality for the Czech Republic. Czech Republic is definitely the wealthiest country among the V4. According to World Bank statistics, GDP per capita (in US dollars) amounted to CZE (21000); SLO (18500); POL (14400); and HUN

(144400) in 2015. Furthermore, the stability of military expenditure is the highest there, which guarantees higher predictability for related contractors from the private sector. These factors may explain, to some extent, why analysed causality exists in the Czech Republic. On the other hand, the TSA confirmed the lack of short-term dependency in the Polish economy, which spends the most (in general value, as well as per capita) on defence within the V4.

SDA did not confirm any causality from military expenses to economic development in considered states. On the other hand, this examination pointed other inter-component relations in CZE, POL, and HUN, which shed more light on defence financing.

Conclusions

Our empirical tests employing the total spending approach confirm the lack of long-term dependency from military outlays to economic growth. This finding is compliant with the major international empirical results conducted towards economies from Central Europe. Nevertheless, defence financing contributes to economic development in the short run in the Czech Republic. Certainly, there is no short-term impact for Poland, Hungary, and Slovakia. This suggests that causality is contingent on national well-being and defence spending's stability, not on the total volume of defence expenditures.

The individual impact of particular outlays within the defence sector on economic development (spending division approach) did not appear; however, this approach provided new information about other inter-component short-run relations. If only the time range of data concerning distribution had not been limited, we could have received more reliable results for the examination. Nonetheless, this line of empirical verification may gain momentum in the future.

To summarise, the spending division approach may top the total spending approach because it provides more knowledge about causalities among components of defence spending. Those findings may heighten national authorities' awareness of the consequences of financial management within the defence sector. Moreover, conclusions from our study pose a guideline for dissidents, especially when they are not certain which categories of expenditure should be financed in order to strengthen economic growth or to induce desirable inter-component relations.

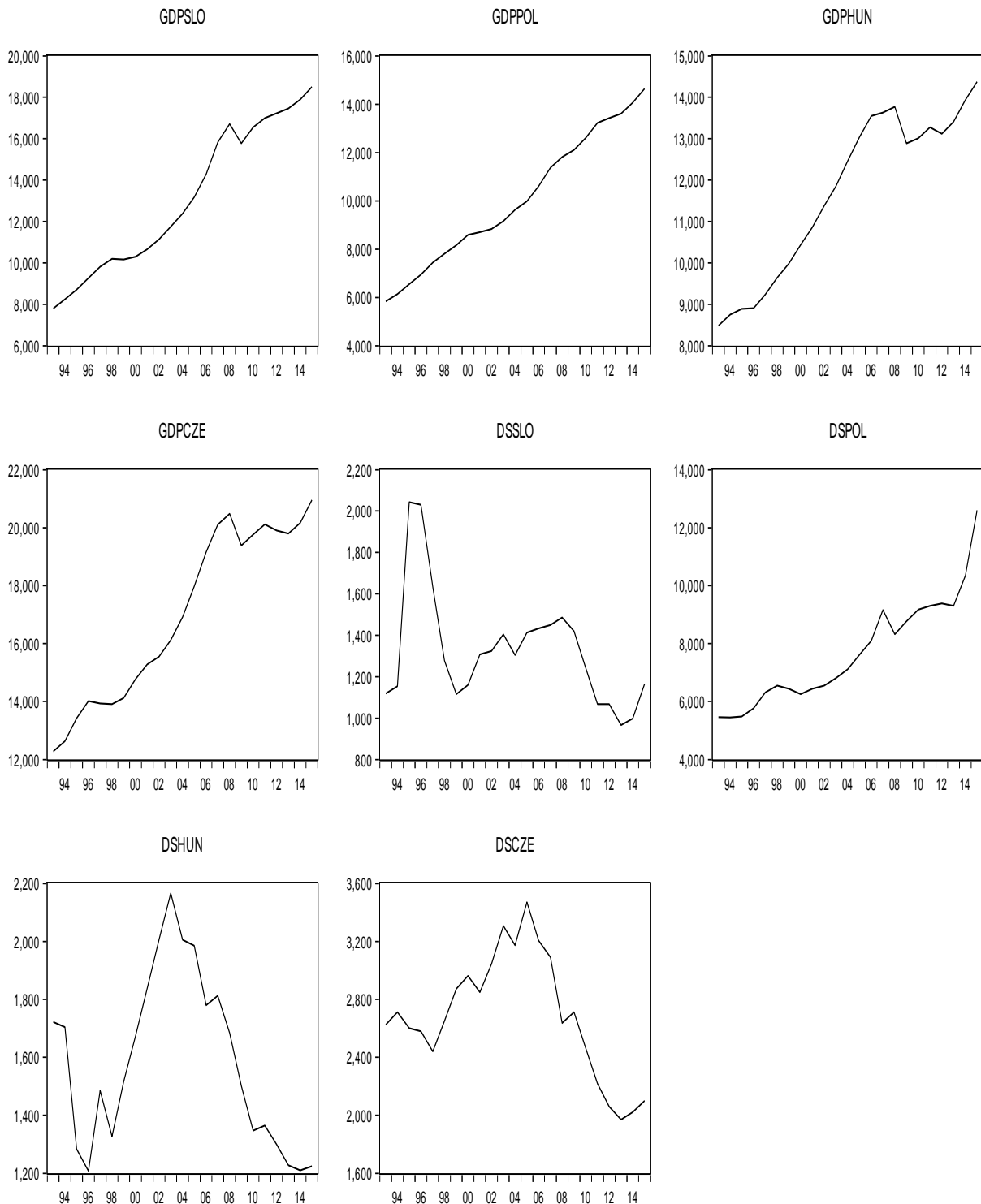
References:

1. Awaworyi, Sefa, and Siew L. Yew. 2014. "The effect of military expenditure on growth: an empirical synthesis", Monash University Discussion Paper, 25(14).
2. Barro, Robert J., and Charles J. Redlick. 2009. "Macroeconomic Effects from Government Purchases and Taxes," NBER Working Paper 15369.
3. Chang, Hsin-Chen, Bwo-Nung Huang, and Chin W. Yang. 2011. "Military expenditure and economic growth across different groups: a dynamic panel Granger-causality approach," *Economic Modelling*, 28(6): 2416-2423. <https://doi.org/10.1016/j.econmod.2011.06.001>
4. Cypher, James M. 2007. "From military Keynesianism to global-neoliberal militarism," *Monthly Review*, June. <https://monthlyreview.org/2007/06/01/from-military-keynesianism-to-global-neoliberal-militarism/>.
5. Daněk, Tomáš. 2015. "Military Expenditures and Economic Growth: The Case of EU Countries," *Ekonomicky Casopis*, 63(8): 853-868.
6. Defence expenditures of NATO Countries 1995-2015. *NATO Statistics*. 2015. http://www.nato.int/cps/ru/natohq/news_120866.htm (accessed August 23, 2016).
7. Dudzeviciute, Gitana, Kestutis Peleckis, and Valentina Peleckiene. 2016. "Tendencies and Relations of Defense Spending and Economic Growth in the EU Countries," *Engineering Economics*, 27(3): 246-252. <http://dx.doi.org/10.5755/j01.ee.27.3.15395>
8. Dunne, Paul J., Eftychia Nikolaidou, and Dimitrios Vougas. 2001. "Defence spending and economic growth: A causal analysis for Greece and Turkey," *Defence and Peace Economics*, 12(1): 5-26. <http://dx.doi.org/10.1080/10430710108404974>
9. Dunne Paul J., and Mehmet Uye. 2009. "Military spending and development," *The Global Arms Trade*, ed. Andrew T. H. Tan, 293-305. London: Routledge.
10. Global Peace Index. (2012, 2015). Institute for Economics and Peace, Sydney.
11. Johansen, Søren. 1988. "Statistical Analysis of Cointegration Vectors." *Journal of Economic Dynamics and Control*, 12(2-3): 231-254. [https://doi.org/10.1016/0165-1889\(88\)90041-3](https://doi.org/10.1016/0165-1889(88)90041-3)
12. Joint statement of the Heads Governments of the V4 Countries. 2016. <http://www.visegradgroup.eu/calendar/2016/joint-statement-of-the-160919> (accessed September 8, 2016).
13. Kollias, Christos. 1995. "Preliminary findings on the economic effects of Greek military expenditure." *Applied Economics Letters*, 2(1): 16-18. <http://dx.doi.org/10.1080/135048595357735>
14. Kollias, Christos, George Manolas, and Suzanna-Maria Paleologou S. 2004. "Defence expenditure and economic growth in the European Union. A casualty analysis." *Journal of Policy Modelling*, 26(5): 553-569. <https://doi.org/10.1016/j.jpolmod.2004.03.013>
15. Kollias, Christos, Nikolas Mylonidis, and Suzanna-Maria Paleologou. 2007. "A panel data analysis of the nexus between defence spending and growth in the EU." *Defence and Peace Economics*, 18(1): 75-85. <http://dx.doi.org/10.1080/10242690600722636>
16. Korkmaz, Suna. 2015. "The Effect of Military Spending on Economic Growth and Unemployment in Mediterranean Countries." *International Journal of Economics and Financial Issues*, 5(1): 273-280.
17. Long-term Vision of the Visegrad Countries on Deepening Their Defence Cooperation. 2014. <http://www.visegradgroup.eu/about/cooperation/defence> (accessed September 10, 2016).
18. MacKinnon, J. G. (1996), "Numerical distribution functions for unit root and cointegration tests, *Journal of Applied Econometrics*, 11: 601-618.
19. Pieroni, Luca. 2009. "Military Expenditure and economic growth." *Defence and Peace Economics*, 20(4): 327-339. <http://dx.doi.org/10.1080/10242690701589876>
20. SIPRI Statistics 1949-2016, Stockholm International Peace Research Institute <https://www.sipri.org/databases/milex> (accessed August 20, 2016).
21. Smith, Ronald P. 1980. "Military expenditures and investment in OECD countries, 1954-1973." *Journal of Comparative Economics*, 4(1): 19-32. [https://doi.org/10.1016/0147-5967\(80\)90050-5](https://doi.org/10.1016/0147-5967(80)90050-5)
22. Smith, Ronald P. 2000. "Defence Expenditure and Economic Growth." *Making Peace Pay A Bibliography on Disarmament and Conversion*. ed. Gleditsch, Nils P., Goran Lindgren, Naima Mouhleb, Sjoerd Smit, and Indra de Soysa, 15-24. Claremont: Regina Books.
23. Thompson, Earl A. 1974. "Taxation and National Defence." *Journal of Political Economy*, 82(4): 755-782. <http://dx.doi.org/10.1086/260232>
24. Topcu, Mert, and Ilhan Aras. 2017. "Military Expenditures and Economic Growth in Central and Eastern EU Countries: Evidence from the Post-Cold War Era." *European Review*, 25(3): 453-462. <https://doi.org/10.1017/S1062798717000114>
25. Topcu, Mert, Ilhan Aras. 2015. "Defense spending and economic growth: Extended empirical analysis for the European Union." *Defence and Peace Economics*, 26(2): 233-246. <http://dx.doi.org/10.1080/10242694.2013.774771>

- 26 Waszkiewicz, Grzegorz. 2016. "Drivers of Greek and Turkish Defense Spending." *International Journal of Management and Economics*, 51:33 - 46.
- World Development Indicators. World Bank Statistics. (accessed August 10, 2016).
- 27 <http://databank.worldbank.org/data/reports.aspx?source=2&series=NY.GDP.PCAP.KD&country>

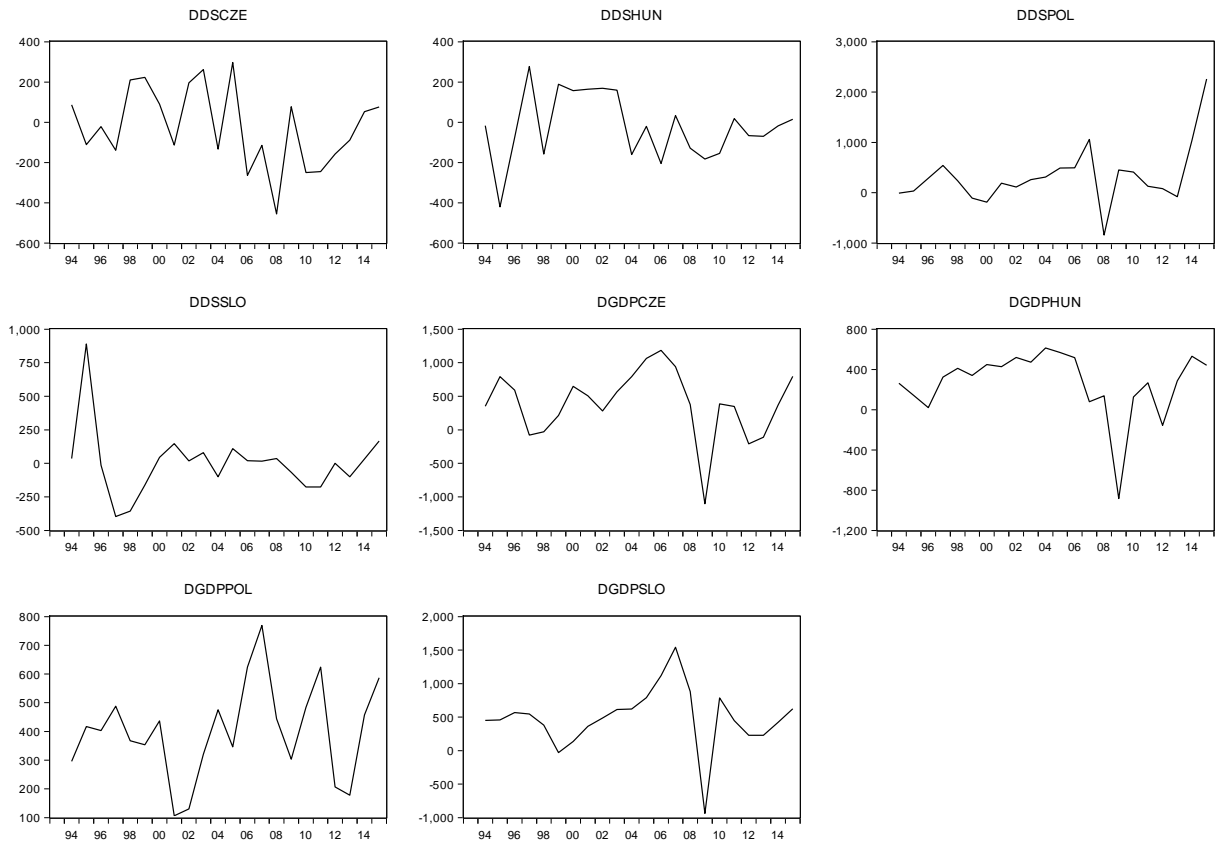
Appendix 1

Figure 1. Linear trends of military expenditures in V4 [total volume, millions USD at constant prices 2014]: 1993-2015

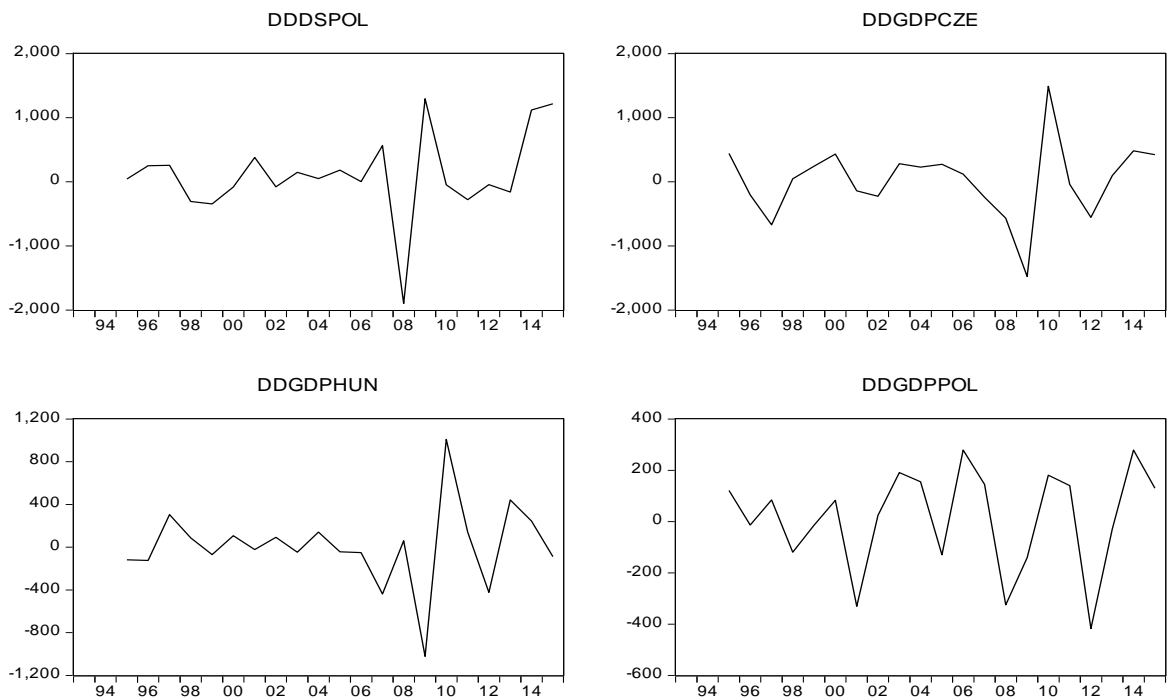


DS – defence spending; GDP – gross domestic product.
Source: Own elaboration in Eviews.

**Figure 1. Linear trends of military expenditures in V4
[total volume, millions USD at constant prices 2014, first difference]: 1994-2015**



**Figure 2. Linear trends of military expenditures in V4
[total volume, millions USD at constant prices 2014, second difference]: 1995-2015**



Note: DS – defence spending; GDP – gross domestic product.
Source: Own elaboration in Eviews.

Table 1. Results of ADF test and asymptotic values

Level, indicant		Economy		CZE	POL	HUN	SLO
		GDP	DS	T-stat	pvalue	T-stat	pvalue
D	GDP	T-stat		2.30	2.07	1.64	2.20
		pvalue		0.415	0.464	0.531	0.464
	DS	T-stat		1.50	0.69	1.12	5.08
		pvalue		0.510	0.960	0.900	0.002***
D (X)	GDP	T-stat		2.92	3.67	3.02	3.71
		pvalue		0.581	0.048**	0.049**	0.011**
	DS	T-stat		4.24	2.24	3.86	-
		pvalue		0.003***	0.196	0.008***	-
DD (X)	GDP	T-stat		4.32	5.57	6.46	-
		pvalue		0.003***	0.001***	0.000***	-
	DS	T-stat		-	5.54	-	-
		pvalue		-	0.001***	-	-

Note: Significance level: *** 1%; ** 5%. T-stat denotes critical value for ADF test (absolute values); pvalue denotes asymptotic value (only results with the lowest P_{value}). Source: Own calculations in Eviews.

Table 2. Results of Johansen Cointegration Test and VECM examination

Variant		No Intercept No Trend	None Intercept No Trend	Linear Intercept No Trend	Linear Intercept Trend	Coefficient EqCointeg (P _{value})
CZE	Trace	0	0	0	0	0.063 (0.085)
	Max-Eig	0	0	0	1	
	Max-Eig	1	0	0	0	
POL	Trace	1	1	0	0	-0.005 (0.580)
	Max-Eig	1	1	0	0	
HUN	Trace	0	0	0	0	
	Max-Eig	0	0	0	0	

Note: 1/0 – number of cointegration vectors. Source: Own calculations in Eviews.

Table 3. Examination of models

Economy	Criterion	Stability	Autocorrelation LM Test	
			P _{value} (1 lag model)	P _{value} (1-2 lag model)
CZE		Yes	0.50	0.59
POL		Yes	0.16	0.41
HUN		Yes	0.90	0.39
SLO		Yes	0.08	0.49

Note: Models' stability verified on the basis of unit roots circle. Source: Own calculations in Eviews.

Table 4. Asymptotic values

Economy	P _{value}	ADF (constant/constant with trend)				
		Gdp	Pers	Equip	Infra	Other
CZE		0.009***	0.000***	0.007***	0.006***	0.000***
POL		0.000***	0.000**	0.146	0.003***	0.000***
HUN		0.001***	0.041**	0.000***	0.005***	0.000***
SLO		0.109	0.136	0.006***	0.008***	0.430

Note: Significance level: *** 1%; ** 5%. Only results with the lowest P_{value}.
Source: Own calculations in Eviews.