

Tendencies of Defence Expenditure and its Structural Changes in the European Union Countries

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Abstract: Nowadays security is one of the most important things and a hot issue among politicians. The European countries are surrounded by threats and have to be prepared to face instability. For every country it is necessary to ensure internal as well as external security. That is why many policy-makers have to decide how much money should be spent on security. This paper investigates the tendencies of defence expenditure and its structural changes in the European Union countries in the period of year between 2004 and 2012. Firstly, based on the defence expenditure as a percentage of Gross Domestic Product (GDP), the European Union (EU) countries have been classified into four categories, such as high defence spenders, upper middle defence spenders, lower middle and low defence spenders. Secondly, the structural analysis of defence expenditure has been applied in the context of the EU countries' groups. To that end, the findings suggest the following: 1) over the period of 2004-2012, spending for military defence has dominated in the structure of total defence expenditure of the EU countries; 2) increase in foreign military aid and R&D defence promote growth of the defence expenditure as a percentage of GDP, while the drop in military and civil defence as well as defence n.e.c. impact on decline of total defence expenditure; 3) high defence spenders report increase in the share for military defence, while other groups of the EU countries show decline of this spending; the increase of the share for foreign military aid has been typical for all the EU countries' groups; 4) high defence spenders have the most significant intensity coefficient of structural changes, while upper middle and low defence spenders' groups have the least changing defence's patterns.

Index Terms: defence expenditure, government expenditure, Gross Domestic Product (GDP), structural changes

JEL: C10, H5, O47.

I. INTRODUCTION

The European countries are surrounded by growing security instability and conflicts in Ukraine, France, Egypt, Libya, Syria, Israel-Palestine and others. According to 2012 data, EU countries spent an average of 1.5 percent of GDP on defence (Eurostat 2012). In 2012, among EU member states in North Atlantic Treaty Organization (NATO), only United Kingdom and Greece met the alliance's target of 2 percent of GDP on defence. Defence expenditure amounted to 1.9 percent of GDP in Estonia

and France during the same year. Over a period of 2006-2012, total defence expenditure has been decreasing an average of more than 10 percent in the EU countries.

Some empirical studies (Irmen, Kuehnel 2008; Ferreiro *et al.* 2009; Sanz 2011; Račkauskas, Liesionis 2012) divide government expenditure into productive and unproductive. Productive expenditure includes spending for defence, education, economic affairs, health, housing and community amenities, environmental protection and public safety. Productive expenditures increase the productivity of productive factors and accelerate the long-term rate of economic growth (Ferreiro *et al.* 2009). Defence expenditure as productive impacts on activity of soldiers, officers. It promotes income to the state budget, helps to reduce the size of black economy. In 2013, the research done by the consulting company "Europe Economics Research" revealed the defence expenditure impact on GDP in the EU. The conclusion has been that when defence expenditure increases by Eur 100 million, GDP goes up by Eur 150 million. What is more, income to the budget increases by Eur 40 million and additionally, it creates 3000 jobs (Šavolskis 2014). Unproductive expenditure involves spending for recreation, culture and religion. On the contrary, this expenditure restricts economic development (Račkauskas, Liesionis 2012).

It is possible to say that defence spending represents the economic or financial burden of each country (Danek 2013; Duella 2014). There is no generally accepted attitude, so every country can characterize defence expenditure according to their needs. There will be significant discrepancy, if we take the comparison in the context of the European Union countries or word-wide. Taking into account the recommendations of the European Commission (Eurostat 2012), in this paper government expenditure is analyzed by function as it presents Eurostat database. It allows making structural analysis and comparing different countries of the EU.

This research attempts to provide more reliable estimates of defence expenditure and its structure in the European Union countries and uses annual data of 2004-2012.

The rest of this paper is organized as follows. Section 2 reviews previous studies on defence expenditure in the context of economic growth and describes research methodology. The investigations are summarized and the main insights are provided. Section 3 analyses the main trends and structural changes of defence expenditure in the EU countries. Section 4 concludes summarizing the main trends observed.

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II. EMPIRICAL RESEARCH REVIEW AND METHODOLOGY

A. Empirical research overview

In recent years, the studies of government expenditure and economic development have been the subject to promote debate among scientists who adhere to the two different schools such as Classical and Keynesians (Wijeweera, Webb 2012; Tiwari, Shahbaz 2013; Duella 2014). According to the Classical School, an increase in government spending is offset by a decline in private investment which will leave the level of GDP unchanged. The Keynesians believe that an increase in government spending through the expenditure multiplier effect will increase the level of GDP (Duella 2014). Defence expenditure can be described by a situation where the country ensures its security for the citizens. From the economics point of view it means that defence expenditure compete with other public goods the citizens may need (Mosikari, Matiwa 2014).

Defence is a classic choice problem affecting rich and poor countries (Hartley, Sandler 2011).

In academic research, the defence expenditure and the economic growth is analyzed from different theoretical aspects. There are several paths in which defence expenditure can affect economic growth and each path can lead to different conclusions (Alptekin, Levine 2012). Shahbaz *et al.* (2013) have described two channels through which defence spending may affect economic growth. The first one has been related with the rise in military expenditure which may increase total demand by stimulating output and ultimately economic growth. The second channel is an increase in defence expenditure, which may also lead to improvements of infrastructure.

According to Pradhan (2010), there are many ways to establish the positive impact of defense expenditure on economic development: 1) defence expenditure leads to formation of human capital, if the part of defence spending is used for education, training, etc.; 2) defense expenditure provides direct technology benefits and spin- offs, where spin- offs applied to the civil sector can promote economic growth; 3) defence expenditure promotes growth, if some of the spending is used for the creation of socio-economic infrastructure like roads, airports, hospitals, etc.; 4) defence expenditure provides protection to the citizens; 5) defense expenditure can improve productivity and generate welfare, if the part of spending is used for revamping the economy during crisis times like terrorist attacks, earthquakes, etc.; 6) In the period of unemployment, defense expenditure stimulates economic growth.

Scientists discuss the issue whether the relationship between defence expenditure and economic growth exists and what is its nature has been raised. Empirical findings have revealed that the effect may be positive or negative or non-existent (Pradhan 2010; Feridun *et al.* 2011; Alptekin, Levine 2012; Anwar *et al.* 2012; Danek 2013; Chairil *et al.* 2013; Duella 2014; Khalid, Mustapha 2014).

Positive effect has been demonstrated referring to the fact that defence spending stimulates economic growth through promoting aggregate demand and making attractive conditions for foreign direct investments. Negative impact on economic growth has been explained by the fact that diverting large government expenditure towards defence sector would leave other economic sectors with less financial resources. The analysis of interrelationship between defence expenditure and economic growth can also reveal the absence of relationship.

Despite a great number of studies regarding defence expenditure and economic growth (Kalyoncu, Yucel 2006; Keller *et al.* 2008; Hirmissa, Baharom (2009); Atesoglu 2009; Yang *et al.* 2011; Danek 2013; Chairil *et al.* 2013; Shahbaz *et al.* 2013; Dimitraki, Ali 2013; Aye *et al.* 2014; Duella 2014; Farzanegan 2014; Mosikari, Matlwa 2014; Dunne, Tian 2015), the results have been inconclusive. To sum up the researches done by different authors, there is no consensus about the existence of relationship between the variables, its nature and direction, due to the level of socio-economic development of the countries involved, the period analyzed as well as the methodology employed. Unidirectional, bidirectional and no causality have been reported by researchers. Hereafter, some results from the contemporary investigations have been described.

Dunne and Tian (2015) examined the impact of military expenditure on economic growth for 106 countries over the period of 1988–2010. The authors grouped countries as developed and developing and concluded that only the long-run effect for the developed countries was insignificant. Consistent results were revealed when countries were divided into three income groups. Taking into account short-run relationship, coefficient estimated negative and significant for all three groups and the long-run coefficient estimated negative and significant for the high-income and low-income groups.

The research of the EU countries revealed that findings reported are not uniformed across all the EU members. It is also found that end of Cold War has significant negative impact on defense expenditures of former east-European countries (Topcu, Aras 2015).

The study of Tiwari and Shahbaz (2013) confirmed a long - run relationship among variables studied and showed that economic growth was positively affected by defence expenditure in India. By re-examining the long – run relationship between economic growth and military expenditure in China, the findings revealed that the increase in the Chinese military expenditure was rapid primarily as a result of the economic development in the country (Dimitraki, Ali 2013).

The studies have concluded that in many cases the association between defence expenditure and economic growth has been detected, but the practices of different countries lead to different results which have not been conclusive until now.

B. Research methodology

This research has been guided by the estimation of defence expenditure tendencies in the European Union countries. The authors refer to methodology considered in studies of different countries and researchers (Ferreiro *et al.* 2009; Cortuk, Singh 2010; Memedovic, Iapadre 2010; Pradhan 2010; Beeres *et al.* 2012). Descriptive statistics measures (Minimum value, Maximum value, Average, Standard Deviation) have been used (Brink 2010; Mathematical Business Methods 2013) and absolute structural change rate as well as the intensity coefficient of structural changes have been calculated (Cortuk, Singh 2010; Memedovic, Iapadre 2010; Dudzevičiūtė *et al.* 2014).

The *absolute structural changes rate* shows structural change of the pattern analyzed. Positive rate value means that structural change accelerates pattern's growth; and negative rate diminishes pattern's growth. The absolute structural changes rate is calculated as follows:

$$M = D_i - D_0; \tag{1}$$

$$M_{sum} = \sum_{i=1}^n M_i$$

where: M - the absolute structural change rate; D_i – activity's share, %; D_0 – activity's share, % in the basic year; M_{sum} - sum of the absolute structural change rate.

The *intensity coefficient of structural changes* shows the patterns' changes intensity in time t_i , compare with basic period. As the coefficient value higher, as more intensive pattern's structural changes, and conversely. The intensity coefficient of structural changes is calculated as follows:

$$K = \frac{\sqrt{\sum_{t=2}^n (S_{t_i} - S_{t_0})^2}}{m} \tag{2}$$

where: K - the intensity rate of structural changes; S_{t_i} – activity's share; t_i, t_0 - current and basic time; n - activity quantity; m - year.

These indicators are easy to calculate, they are informative for interpretation of their impact on patterns' development. However, they give only general information and do not reveal the reasons for structural changes.

III. THE ANALYSIS OF DEFENCE EXPENDITURE IN THE CONTEXT OF THE EU COUNTRIES

A. The tendencies of defence expenditure in 2004-2012

Therefore, it is of great importance to investigate and summarize the main tendencies and structural changes of defence expenditure in EU countries. Firstly, referring to the empirical studies, general tendencies of defence expenditure as a percentage of GDP and economic growth as real GDP per capita have been presented (Fig. 1). Secondly, EU countries have been grouped into four categories, such as high defence spenders, upper middle defence spenders, lower middle as well as low defence spenders (Table 1). Descriptive statistics has been carried out comparing these countries' groups. Thirdly, within defence pattern structural analysis has been applied. Finally, the conclusions on the comparative analysis basis have been made.

Over a period of 2004-2012, defence expenditure as percentage of GDP as well as GDP per capita have varied in the EU countries, as shown in Figure 1. In general, defence expenditure as a percentage of GDP has decreased from an average of 1.5 percent in 2004 to 1.3 percent in 2012. At the same time real GDP per capita has increased an average of 5 percent.

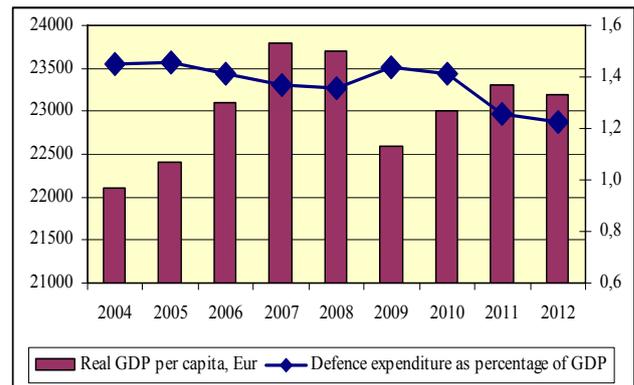


Fig. 1. General tendencies of defence expenditure and GDP per capita in EU countries

Source: authors' calculations based on Eurostat data 2004-2012.

Within the EU28 countries, there are clearly some interesting variations in defence expenditure share of GDP and economic performance. Estimating the general tendencies of two ratios, a negative association could be detected. This suggests that there are economically rich countries that are high and upper middle defence spenders (United Kingdom, France, Scandinavian countries) and rich countries that are low and lower middle defence spenders (Luxembourg, Austria, Ireland, Belgium, Germany, the Netherlands) as well as there are economically weak countries which spend a lot on defence (Greece, Romania, Bulgaria) and countries which are economically weak with lower middle defence expenditure (Slovakia, Lithuania, Latvia, Poland, Hungary) (Table 1.).

TABLE 1.
THE GROUPS OF EU COUNTRIES BY THE SHARE OF DEFENCE EXPENDITURE IN GDP

Groups of the countries by defence expenditure	Average, 2004-2012		Groups of the countries by defence expenditure	Average, 2004-2012	
	Defence expenditure as percentage of GDP	Real GDP per capita, Eur.		Defence expenditure as percentage of GDP	Real GDP per capita, Eur.
High defence spenders			Lithuania	1.4	7 167
Greece	2.8	17 489	Italy	1.4	24 078
United Kingdom	2.5	31 000	Portugal	1.4	14 744
Upper middle defence spenders			Slovenia	1.4	15 211
Cyprus	1.9	18 556	Latvia	1.2	6 300
France	1.9	27 578	Poland	1.2	7 433
Romania	1.7	4 322	Hungary	1.1	8 900
Estonia	1.6	8 844	Czech Republic	1.1	11 056
Sweden	1.6	34 100	Spain	1.1	20 967
Bulgaria	1.5	3 389	Germany	1.0	28 589
Finland	1.5	30 933	Belgium	1.0	29 522
Denmark	1.5	38 144	Low defence spenders		
Croatia	1.5	8 689	Austria	0.8	31 133
Lower middle defence spenders			Malta	0.8	12 911
Netherlands	1.4	32 722	Ireland	0.4	38 089
Slovakia	1.4	8 344	Luxembourg	0.3	65 444

Source: authors' calculations based on Eurostat data 2004-2012.

As table above shows, defence expenditure as percentage of GDP varies across countries. According to Dunne and Nikolaidou (2012), "some differences reflect security issues, but more are likely to reflect internal pressures resulting from the existence of military industries".

Hereafter descriptive statistics has been employed to get more complete picture of defence expenditure across the EU countries' groups (Table 2).

TABLE 2.
DESCRIPTIVE STATISTICS OF DEFENCE EXPENDITURE IN THE EU COUNTRIES

Groups of the countries by defence expenditure	Min value	Max value	Average of defence expenditure, % of GDP	Standard deviation
High defence spenders	2.5	2.8	2.6	0.32
Upper middle defence spenders	1.5	1.9	1.6	0.33
Lower middle defence spenders	1.0	1.4	1.2	0.23
Low defence spenders	0.3	0.8	0.6	0.23

Source: authors' calculations based on Eurostat data 2004-2012.

Using average data of 2004-2012, Table 2 reports the estimates of descriptive statistics by countries groups. The

Standard Deviation measures how spread out data values. Lower middle and low defence spenders' groups have the same Standard deviation which is smaller than of other two groups, such as high and upper middle spenders. The smaller the Standard Deviation shows the more concentration of data around the mean.

A more detailed analysis is needed to explain structural changes of the defence pattern. Next section is devoted for this issue.

B. Composition of defence expenditure

Previous section has presented the overview of total defence expenditure's tendencies in the EU countries' group. But breakdown of the defence expenditure on the basis of the activities has been also of considerable interest to policy makers as well as analysts. In this section, the structural analysis has been based on the Eurostat's classification which provides the data on an internationally comparable basis and is known as the Classification of Function of Government. According to this classification, defence expenditure includes military defence, civil defence, foreign military aid, research and development (R&D) defence and defence n.e.c. (network-enabled capability). The main insights have been provided in the period of 2004-2012.

In 2004 as well as 2012, spending for military defence with the share of 88.1 % and 87.7 % respectively dominated in the structure of total defence expenditure of the EU countries (Fig. 2.).

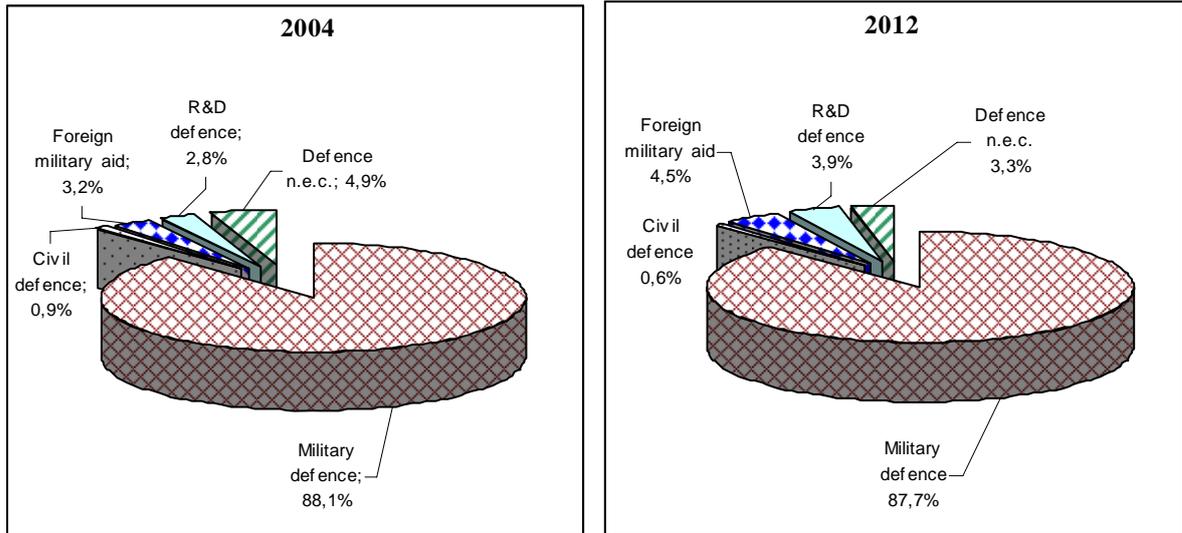


Fig. 2. Breakdowns of defence expenditure in the EU countries
 Source: authors' calculations based on Eurostat data 2004 and 2012.

Figure 2 presents, that from 2004 to 2012, the structure of defence pattern has remained the same. Overall, the most common findings are that foreign military aid and R&D defence affect the growth of defence expenditure, while military and civil defence as well as defence n.e.c. impact on decline.

In order to evaluate structural changes of defence pattern by the EU countries' groups, the *absolute structural changes rate* and the *intensity coefficient of structural changes* have been applied. The results have been summarized in Table 3.

TABLE 3.
 DEFENCE PATTERNS BY THE EU COUNTRIES' GROUPS

Countries' group / expenditures	2004	2012	Structural changes	
			Absolute rate, percentage point	Intensity coefficient
<u>High defence spenders</u>				
Military defence	86.0	86.7	0.7	0.1
Civil defence	0.3	0.3	0.0	0.0
Foreign military aid	3.1	6.3	3.2	0.4
R&D defence	1.5	6.2	4.7	0.6
Defence n.e.c.	9.1	0.5	-8.6	1.1
Total	100.0	100.0	0.0	2.2
<u>Upper middle defence spenders</u>				
Military defence	87.9	87.4	-0.5	0.1
Civil defence	1.5	0.9	-0.6	0.1
Foreign military aid	3.3	3.7	0.4	0.1
R&D defence	4.4	4.4	0.0	0.0
Defence n.e.c.	2.9	3.6	0.7	0.1
Total	100.0	100.0	0.0	0.4
<u>Lower middle defence spenders</u>				
Military defence	90.1	88.7	-1.4	0.2
Civil defence	1.0	0.7	-0.3	0.0
Foreign military aid	3.2	3.8	0.6	0.1
R&D defence	2.7	1.9	-0.8	0.1
Defence n.e.c.	3.0	4.9	1.9	0.2
Total	100.0	100.0	0.0	0.6

<u>Low defence spenders</u>				
Military defence	87.9	86.2	-1.7	0.2
Civil defence	0.1	0.3	0.2	0.0
Foreign military aid	5.0	6.5	1.5	0.2
R&D defence	0.1	0.1	0.0	0.0
Defence n.e.c.	6.9	6.9	0.0	0.0
Total	100.0	100.0	0.0	0.4

Source: authors' calculations based on Eurostat data 2004 and 2012.

Over the period of 2004-2012, absolute rates of structural changes and intensity coefficients of structural changes have varied across the EU countries' groups, as shown in Table 3. The structural analysis of defence expenditure has revealed that high defence spenders report increase in the share for military defence, while other groups (upper middle defence spenders, lower middle and low middle) show decline of this spending. The increase of the share for foreign military aid has been typical for all the EU countries groups. This varies from 0.4 percentage points in upper middle defence spenders to 3.2 in high defence spenders' group. The absolute rate of structural changes has pointed to growth as well as decline in the shares of civil defence, R&D defence and defence n.e.c. as well across the countries' groups. Moreover, estimations suggest that high defence spenders could be characterized as the countries' group with the most significant intensity coefficient of structural changes which makes an average of 2.2. Lower middle defence spenders have less coefficients of intensity and this amounts to 0.6. Upper middle and low defence spenders have the least changing patterns of defence.

Next section summarizes the results of the research and provides the main insights.

IV. CONCLUSIONS

The paper investigates the tendencies of defence expenditure and its structural changes in the European Union countries in the period of year between 2004 and 2012.

Within the EU countries, there have been clearly some interesting variations in defence expenditure share of GDP and economic performance. Estimating the general tendencies of two ratios, a negative association could be detected. But the practices of different countries lead to different results which have not been conclusive until now.

The empirical evidence highlights different results among the EU countries' groups regarding defence expenditure and its structural changes. It is noticeable that in 2004 as well as 2012, spending for military defence dominated in the structure of total defence expenditure of the EU countries. In the same period of time, the structure of defence pattern has remained the same. Given the results of the research, the authors argue that increase in foreign military aid and R&D defence promote growth of the defence expenditure as a percentage of GDP, while the

drop in military and civil defence as well as defence n.e.c. impact on decline of total defence expenditure.

The research has shown that absolute rates of structural changes and intensity coefficients of structural changes have varied across the EU countries' groups. High defence spenders report increase in the share for military defence, while other groups (upper middle defence spenders, lower middle and low middle) show decline of this spending. The increase of the share for foreign military aid has been typical for all countries groups.

Moreover, estimations suggest that high defence spenders could be characterized as the countries' group with the most significant intensity coefficient of structural changes. The countries which belong to lower middle defence spenders' group have less coefficients of intensity, while upper middle and low defence spenders' group have the least changing defence's patterns.

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