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**Influence of the Global Financial Crisis on Fiscal Burden in the
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Influence of the Global Financial Crisis on Fiscal Burden in the EU Economies

Abstract

The main aim of the article is to assess an influence of the last global financial crisis on the level of fiscal burden in Central European countries compared to old member states of the EU. In the research the fiscal burden was treated as multidimensional phenomenon, which should be analyzed with application of multiple criteria analysis tools. In the research zero unitatization method was applied, which allowed to create synthetic measure of the fiscal burden in the EU countries in the years 2004-2015. The measure allowed to propose rankings of the countries and assess the changes of the level of the fiscal burden during and after the crisis. The research was based on the Eurostat data.

Keywords: fiscal burden, multiple criteria analysis, zero unitarization method, synthetic measure

JEL classification: E61, C38, 052

Introduction

The last decades in developed countries were a period of almost continuous growth in economic activity of the state. This increasing activity and its high cost in many cases resulted in growing fiscal burden (Tanzi & Schuknecht, 1995; 1997). This tendency has been strengthened as a result of the last global financial crisis, which has destabilized fiscal systems of some European economies (Baran 2014; Mackiewicz-Łyziak, 2015). Both theory and empirical research confirm that in the long term the lack of prudent fiscal policy and high fiscal burden can reduce the steady state of European economy and threaten its sustainability (Balcerzak *et al.*, 2016; Balcerzak & Rogalska, 2016; Balcerzak & Pietrzak, 2016a; Pietrzak, & Balcerzak, 2016).

In this context the main objective of the paper is to assess an influence of the last global financial crisis on the fiscal burden in Central European economies (EU-13) that joined the EU after the year 2004 compared to old member states (EU-15). In the research multiple criteria analysis tools were applied. The analysis was conducted for the years 2004, 2009 and 2015. The first year of the research is the year of the biggest EU enlargement and the time of good economic prosperity. The year 2009 can provide an information on the crisis situation.

The year 2015 is the last year of data availability. In the research data from Eurostat for 28 EU member states was used. It is a continuation of previous studies of the author (Balcerzak, 2013).

Financial Burden as a Multiple Criteria Analysis Problem

The fiscal burden is a complex and multiple criteria phenomenon (Kirchler, 2007; Šimková, 2015). On the one hand, it is a consequence of long-term factors, such as a structure of public expenditure (share of fixed expenditures in the budget of a country), the level of long-term interference of governments in economies, an adopted economic model (a model traditionally referred to as the welfare state or individualistic market economy model). On the other hand, the current fiscal situation is affected by short term cyclical factors associated with an impact of automatic stabilizers, or a necessity of discretionary fiscal stabilization actions (Balcerzak, 2013). Thus, in order to measure it with application of quantitative methods a wide range of indicators must be taken into consideration.

Based on the previous research of the author a set of six final diagnostic variables was proposed for measuring the fiscal burden in the European countries. The set of preliminary variables assessed with formal statistical criteria of information value is given by Balcerzak (2013). The variables with classification as stimulants and dis-stimulants are given in Table 1. It is assumed that in the case of stimulants a growth of the value of the variable increases the fiscal burden. For dis-stimulants it is opposite.

Table 1. Diagnostic variables applied for measurement of the fiscal burden

	Variable	Variable characteristics
x_{1t}	Total general government expenditure measured as a percentage of GDP	Stimulants – high level government expenditure in the long term can become a threat to financial sustainability of a country and it increases the fiscal burden.
x_{2t}	General government net lending/net borrowing measured as a percentage of GDP	Dis-stimulant – low level of government deficit enables to conduct effective anti-cyclical fiscal policy. It decreases the risk of tax rises due to fiscal adjustments.
x_{3t}	Government consolidated gross debt measured as a percentage of GDP	Stimulant – high level of government debt is the main factor increasing the fiscal burden. During fiscal consolidation episodes, the governments usually tend to increase the level of taxation. The cases of decreased level of expenditure are more rare.
x_{4t}	Taxes on production and imports less subsidies measured as a percentage of GDP	Stimulant – high level of taxation can become an obstacle in increasing government revenue, it increases the fiscal burden.
x_{5t}	Current taxes on income, wealth measured as a percentage of GDP	Stimulant – high level of taxation can become an obstacle in increasing government revenue, it increases the fiscal burden.
x_{6t}	Social benefits measured as a percentage of GDP	Stimulant – high redistribution activity can force governments to increase revenues. Thus, it increases the fiscal burden.

Source: own work based on Balcerzak (2013).

The variables given in table 1 fulfill the formal information value criteria concerning diagnostic variables applied in taxonomic analysis. It is assumed that high information value variables should be characterized with three formal statistical criteria: a) high level of variation, b) high information value, c) low level of correlation (Hellwig, 1972a, pp. 69-90). The specific description of the criteria is provided by Balcerzak (2016a; 2016b).

Dynamic Multiple Criteria Analysis with Application of Synthetic Measure

As it was pointed in the previous part, the fiscal burden should be considered as a complex multiple criteria phenomenon (Hellwig, 1972; Olczyk, 2014; Renigier-Biłozor & Biłozor, 2015; Jantón-Drozdowska & Majewska, 2015, 2016; Małkowska & Głuszak, 2016, Reiff et al., 2016; Balcerzak & Pietrzak, 2016b; Wątrobowski et al., 2016). Therefore, a classic taxonomic approach for organizing and sharing of objects based on normalization of variables with zero unitarisation method can be applied here (Kukuła, Bogocz 2014, pp. 5-13; Balcerzak, 2009; 2015; Łyszczarz, 2016). In the research a constant reference point for the years 2004, 2009 and 2015 was used, which is a condition for obtaining comparability of the results in time. In the analysis the ordering of countries starting from the once with the highest level of the fiscal burden to the once with its lowest level was assumed.

The stimulants were normalized with the equation 1 and the dis-stimulants with the equation 2.

$$z_{ijt} = \frac{x_{ijt} - \min_{it} \{x_{ijt}\}}{\max_{it} \{x_{ijt}\} - \min_{it} \{x_{ijt}\}} \quad (i = 1, 2 \dots n); (j = 1, 2 \dots m); (t = 1, 2 \dots l), z_{ij} \in [0, 1] \quad (1)$$

$$z_{ijt} = \frac{\max_{it} \{x_{ijt}\} - x_{ijt}}{\max_{it} \{x_{ijt}\} - \min_{it} \{x_{ijt}\}} \quad (i = 1, 2 \dots n); (j = 1, 2 \dots m), (t = 1, 2 \dots l), z_{ij} \in [0, 1] \quad (2)$$

Assessment of a synthetic measure of fiscal burden ($SMFB_{it}$), which characterizes all the objects, was obtained with the equation 3.

$$SMFB_{it} = \frac{1}{m} \sum_{j=1}^m z_{ijt} \quad (3)$$

$$(i = 1, 2 \dots n); (j = 1, 2 \dots m); (t = 1, 2 \dots l); SMFB_i \in [0, 1]; z_{ij} \in [0, 1]$$

The rankings of the countries are given in table 1.

Table 1. The result of ordering the countries based on the synthetic measure of the fiscal burden in the years 2004-2015

No	2004		2009		2015	
	Country	$SMFB_{it}$	Country	$SMFB_{it}$	Country	$SMFB_{it}$
1	SE	0,538	GR	0,597	GR	0,632
2	DK	0,514	FR	0,581	FR	0,590
3	AT	0,505	DK	0,570	DK	0,578
4	FR	0,489	BE	0,552	IT	0,564
5	BE	0,466	SE	0,537	BE	0,554
6	IT	0,448	IT	0,534	FI	0,553
7	DE	0,423	AT	0,533	AT	0,510
8	HU	0,419	PT	0,472	SE	0,498
9	GR	0,409	HU	0,466	PT	0,495
10	HR	0,376	UK	0,461	HR	0,420
11	PT	0,364	DE	0,450	HU	0,406
12	FI	0,364	FI	0,450	SI	0,404
13	PL	0,340	IE	0,444	UK	0,401
14	LU	0,328	NL	0,407	ES	0,392
15	SI	0,323	HR	0,386	NL	0,389
16	MT	0,312	SI	0,366	DE	0,378
17	NL	0,312	ES	0,363	CY	0,344
18	UK	0,303	LU	0,363	SK	0,318
19	CY	0,261	PL	0,351	MT	0,305
20	CZ	0,253	LT	0,340	LU	0,293
21	ES	0,215	MT	0,328	PL	0,282
22	SK	0,213	CY	0,322	IE	0,238
23	BG	0,190	SK	0,319	CZ	0,233
24	IE	0,135	CZ	0,293	BG	0,229
25	LT	0,129	LV	0,286	EE	0,194
26	LV	0,114	EE	0,279	LV	0,182
27	RO	0,094	RO	0,254	RO	0,166
28	EE	0,090	BG	0,212	LT	0,148

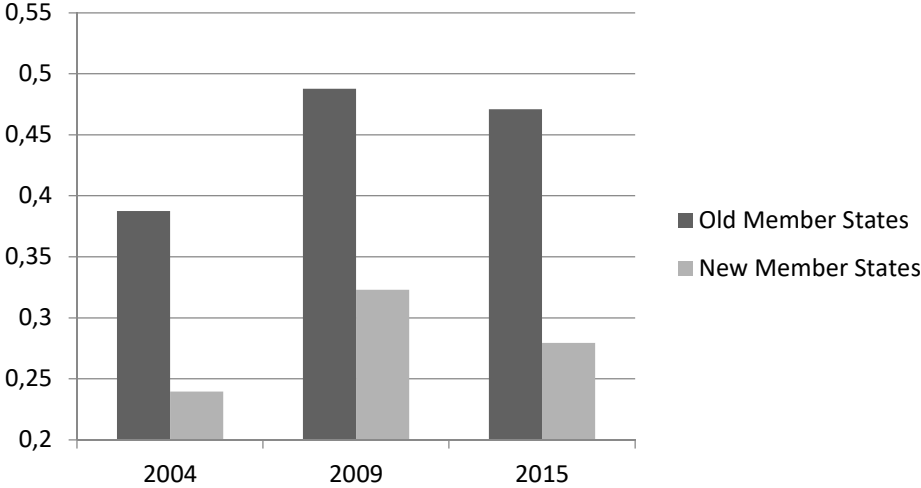
Source: own estimation based on Eurostat data.

The results from table 1 indicate that the Central European countries are characterised with relatively low level of the fiscal burden. Only Hungary was rated among the first ten countries with the highest level of $SMFB_{it}$. The research confirms the influence of the global financial crisis on the EU economies. Greece that have faced the problem of bankruptcy, in the year 2004 was ninth in the rating. However, in the year 2009 and 2015 Greece obtained the highest value of $SMFB_{it}$ in the EU.

These conclusions are confirmed, when one analyses figure 1 presenting an average level of $SMFB_{it}$ for EU-13 and EU-15, and figure 2, where an average percentage changes of the

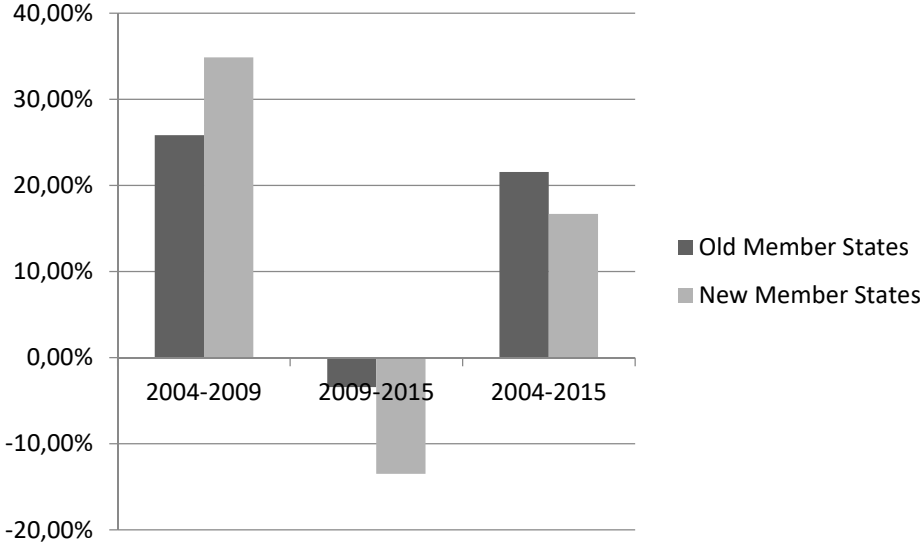
values of $SMFB_{it}$ for EU-13 and EU-15 are given. Figure 1 confirms noticeable heterogeneity between two groups of countries with much higher average value of $SMFB_{it}$ in EU-15.

Figure 1. The average level of the synthetic measure of fiscal burden for new (EU-13) and old member states (EU-15) in the years 2004, 2009, 2015



Source: own estimation based on Eurostat data.

Figure 2. The average percentage change of the value of synthetic measure of fiscal burden for new (EU-13) and old member states (EU-15) in the years 2004-2009, 2009-2015 and 2004-2015



Source: own estimation based on Eurostat data.

The disparity between EU-13 and EU-15 was strengthened during the crisis (Figure 2). In the years 2004-2009 the average percentage increase of the value of $SMFB_{it}$ for EU-13 was 34%, whereas for EU-15 it was only 25%. However, EU-15 started from much higher level in the year 2004. Additionally, the average decrease of the value of $SMFB_{it}$ in the years 2009-2015 was four time higher in the case of EU-13 than EU-15. As a result, in the whole

analysed period the average growth of the value of $SMFB_{it}$ for EU-15 was equal to 21,16%, whereas for EU-13 it was only 16,7%, and it started from the lower base.

Conclusions

The objective of the research was to assess the influence of the last global financial crisis on the fiscal burden in Central European countries compared to old member states of the EU. In the study a multiple criteria analysis tools were applied for 28 EU member states in the years 2004-2015.

The research confirmed a noticeably higher average level of the fiscal burden in the EU-15, which was additionally increased after global financial crisis. What is more, after the crisis the situation of EU-15 was improving at a lower rate, than in the case of EU-13.

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