Fiscal Adjustments in the European Union versus West Balkans Economies: Evidence from Heterogeneous Panels

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ABSTRACT

This paper empirically assesses heterogeneity of fiscal adjustments in the European Union and West Balkans economies, in the circumstances when debt crisis renewed the questions when and how governments adjust their public expenditure. The research covers sample of 28 European Union economies and 5 West Balkans economies over the period 1995-2018. The results based on PMG panel model point to *weak* fiscal sustainability with significant fiscal adjustments, in average 28.18 % of deviations from equilibrium relationship are corrected in one year. Moreover, the research provides heterogeneous evidence of public expenditure adjustments to long-run equilibrium relationship in European Union and West Balkans economies. According to the results, candidates and potential candidates for European Union membership have improved their public finances, however, accession process does not lead to automatic convergence of these economies and fiscal sustainability assessment

Key words: *fiscal adjustments, European Union economies, West Balkans economies, heterogeneous panels*

JEL Classification: C33, H50, H62

INTRODUCTION

The essence of fiscal sustainability framework is the question of time and way to undertake fiscal adjustments. The question of time is related to the phases of business cycle, whether to adjust in expansion or recession phase, while the way is connected to the question whether to cut public expenditure or to raise the taxes, and finally the effects of fiscal adjustments on GDP growth. Recent papers in this theme showed that there are fewer costs of fiscal adjustments based on public expenditure in comparison to fiscal adjustments based on austerity measures, and that way of fiscal adjustment is more important in comparison to state of the cycle (Alesina at al. 2016). Therefore, the research question in this paper is related to the problem how governments of European economies adjust their public expenditures in circumstances of limited capacities of economies, and in some cases overindebtness. Focus is on European Union economies which are faced with unique monetary and heterogeneous fiscal policies, due to lack of supranational fiscal rules. Defined fiscal policy framework with Maastricht Treaty (1992), Stability and Growth Pact (1997), and Fiscal Compact (2012), still leave room for heterogeneous fiscal adjustments and fiscal (ir)responsibility in European Union economies. Special attention in this paper is dedicated as well to West Balkans economies which are in the accession phase to

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European Union and fiscal adjustments that those economies undertake in order to fulfill defined goal for membership. Heterogeneity in the sample is important as well due to EU accession dynamic, namely, each West Balkans economy movement forward EU membership is dependent on own results achieved. Therefore, fiscal sustainability and heterogeneous fiscal adjustments based on flow model are estimated in this paper using Westerlund cointegration test, Mean Group (MG), Pooled Mean Group (PMG) estimators. The results point to *weak* fiscal sustainability in European Union and West Balkans economies and provide heterogeneous evidence of fiscal adjustment of public expenditure to long-run equilibrium relationship. Purposed fiscal adjustments in order to assess fiscal sustainability are distinguished from ad hock changes in public expenditure that have reduced efforts for sound fiscal policy.

The organization of the paper is as follows. After the introduction, next section briefly shows literature review related to the question of fiscal sustainability and fiscal adjustment. In the next section are defined hypotheses, methods and data. The following, comparative analysis of fiscal variables in the European Union and West Balkans economies are represented. In the next section, the estimation results for fiscal adjustments using panel cointegration analysis with heterogeneous parameters are given. The last section contains of the main conclusions and policy recommendations.

LITERATURE REVIEW

Fiscal sustainability and fiscal adjustments have been issued to the debate in European economies and worldwide, especially in the last three decades. The most often are the studies with the aim to estimate fiscal (un)sustainability using time-series analysis, or panel data models with the focus on different groups of economies, while some studies are oriented toward estimation of fiscal reaction function.

In the pioneer papers of modern fiscal sustainability concept, the analysis is often based on USA fiscal sustainability and fiscal adjustment. Two traditional approaches of fiscal sustainability are identified. First is based on papers from Hamilton and Flavin (1986) and Wilcox (1989), and it is related to the empirical analysis of public debt and primary deficit stationarity. Namely, intertemporal budget constraint could be satisfied when the value of public debt corresponds to the sum of future primary surpluses and when present value of public debt approaches zero in infinity. That could be analysed using stationarity test, so when primary deficit is stationary process, fiscal sustainability is achieved and the condition for intertemporal budget constraint is fulfilled. Second approach is based on papers from Hakkio and Rush (1991) and Quintos (1995) - the cointegration analysis between public expenditure and public revenues. Hakkio and Rush (1991) showed that if public expenditure and public revenues are integrated of order 1, these two variables could be cointegrated. If the cointegration parameter b is 1, fiscal sustainability is assessed, otherwise, is unsustainable. However, Quintos (1995) relaxed previous assumptions, distinguishing *strong* sustainability condition (when cointegration parameter is b=1, and first difference of fiscal debt is stationary process), from *weak* sustainability condition (when cointegration parameter is in the range from 0 to 1, and second difference of fiscal debt is stationary process).

Among the first papers which have analysed fiscal sustainability and fiscal adjustment using these concepts in European economies in the frame of time-series analysis are Caporale (1995), Vanhorebeek and van Rompuy (1995), and further Papadopoulos and Sidiropoulos (1999), Santos Bravo and Silvestre (2002), Afonso (2004), Greiner, Koeller, and Semmler (2004), Krejdl (2006), Neaime (2015). However, due to relatively lower power of tests proposed for time-series, in comparison to tests defined for panel data, and due to availability of longer panel data-sets in the recent years, panel analysis is more frequently used. Rault and Alfonso (2007) analysed sample of 15 EU economies for the period 1970-2006 using unit root tests of first and second generation, Banerjee and Carrion-i-Silvestre test (2006), Westerlund and Edgerton

(2007) cointegration test. The results showed that fiscal policy is sustainable for the EU-15, as well as in the two separated sub-periods 1970-1991 and 1992-2006, and that public expenditure adjusts to long-run equilibrium relationship. In the paper from the year 2015, Afonso and Rault showed that fiscal sustainability is questionable in some EU countries in the period 1960-2012. In this paper, analysis are undertaken using Seemingly Unrelated Regression - SUR method, SURADF test for level of integration, Westerlund (2007) test for cointegration, Polled Mean Group - PMG method and Common Correlated Effects - CCE method. However, we have remarked that Bohn (2007) harsh critique the way of fiscal sustainability analysis – based on unit roots and cointegration, pointing out that any finite order of integration of public expenditure, public revenues and public debt leads also to intertemporal budget constraint fulfilment, namely *"absurdly weak"* sustainability (when the order of integration is *m*). Bohn emphasises that the best option for fiscal sustainability testing is error-correction model, namely, analysis whether fiscal reaction function are determined by level of indebtedness.

Moreover, fiscal sustainability concept based on flow models (between public revenues and public expenditure) is implemented for different groups of countries and period of time. Beside European economies, fiscal sustainability in OECD economies is often subject of investigation. Alfonso and Jalles (2012) analysed fiscal sustainability in OECD countries in the period 1970-2010, taking into account structural breaks parallel with cointegration analysis in time-series and in the panel. Results show that fiscal sustainability is questionable in majority of countries, and that *weak* sustainability exists in some countries. In the paper from 2015, Afonso and Jalles using sample of 18 OECD economies in the period 1970-2010, analysed fiscal sustainability by modern econometric techniques, Pesaran CIPS test, Pedroni cointegration tests, FMOLS method, identifying that accumulation of public debt is the main disturbing factor of fiscal sustainability in this group of countries. Westerlund and Prohl (2007) undertook DOLS and FMOLS methods to estimate non-stationary panels, taking into a consideration structural breaks for 8 OECD countries in the period 1977-2005. Chow (2013) as well used FMOLS and DOLS methods for heterogeneous panels to estimate fiscal sustainability in 28 countries in the period 1981-2011. Author concluded that *weak* sustainability exists in the analyzed sample and emphasised advantages of methods for heterogeneous panel estimation. Josifidis et al. (2018) as well emphasise the importance of heterogeneity in the sample of European Union economies, namely, the study provides evidence of heterogeneous effects of different public policies on fiscal sustainability in EU-28. On the other hand, Ehrhart and Llorca (2008) showed fiscal sustainability in six South-Mediterranean countries, while Campeanu and Andreea (2010) analyzed fiscal sustainability and fiscal reactions in Central and Eastern European countries, distinguishing economies which fiscal adjustments could improve the ability to run a primary surplus, from economies with opposite responses. Kumar, Leigh, and Plekhanov (2007) focused on fiscal consolidation in OECD economies, identifying short-run and long-run effects of fiscal adjustments on economic activity; short-run effects could be contractionary, while long-run could be expansionary. Yang, Fidrmuc, and Ghosh (2015) confirmed contractionary effects of fiscal adjustment in OECD economies in the short-run, and in line with the results of Alesina (2016), authors show that spending-based fiscal adjustments lead to smaller output losses in comparison to tax-based fiscal adjustments.

Summing up all the findings in the literature, there are two main concepts of fiscal sustainability analysis (stationarity analysis and cointegration analysis) and relatively novel methodology based on multicointegration analysis (Engsted, Gonzalo, and Haldrup, 1997, and Camarero, Carrion-i-Slvestre and Tamarit, 2013). There also different econometric techniques for estimation, different groups of countries and length of time dimension in studies, and therefore, there is no common conclusion related to fiscal adjustments and strong/weak fiscal sustainability *versus* fiscal unsustainability in analysed groups of countries.

HYPOTHESES, METHODOLOGY AND DATA

Taking into a consideration conclusions from the literature review, especially critiques of stationarity and residual-based cointegration tests in paper of Bohn (2007), in this paper we estimated error-correction model and heterogeneous short-run adjustments in the sample of 28 European Union economies and 5 West Balkans economies in the period 1995-2018. Following research hypotheses are tested:

H_1: Cointegration relationship between flow variables exists in homogeneous parameters - fiscal sustainability exists in the sample of European Union and West Balkans economies.

H_2: Short-run fiscal adjustments to equilibrium long-run relationship are heterogeneous in the sample of European Union and West Balkans.

The research methodology in this paper is based on heterogeneous, nonstationary panel data framework, which allows the analysis on fiscal adjustments across West Balkans and European Union economies and differences over the time. The sample contains the data on 33 economies, namely 28 European Union members and 5 West Balkans economies (Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia) over the period 1995-2018. An important goal in this paper to estimate heterogeneous fiscal adjustments to long-run cointegration relationship (hypotheses 2), and therefore, preferable models are proposed by Pesaran, Shin, and Smith (1999) - Mean Group (MG) or Pooled Mean Group (PMG) estimator. Panel error-correction model is described as:

$$\Delta lt_{it} = \Phi_i(t - \theta_i lg_{it}) + \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta lt_{i,t-1} + \sum_{j=0}^{q-1} \delta_{ij}^* \Delta lg_{i,t-j} + \mu_i + u_{it} \qquad (1)$$

where, Φ_i is error-correction parameter, indicating speed of adjustment to long-run equilibrium relationship, θ_i is $\mathrm{long-run}$ relationship, λ_{ij}^* is coefficient of lagged dependent variable, δ_{ij}^* is short-run parameters for each panel unit, μ_i represents individual effects. MG is based on estimation of *N* time-series regressions and averages coefficients, while PMG is based on equal long-run relationship across all panel units and averaging of coefficients (short-run adjustments). In order to find out whether the restriction related to homogeneous long-run relationship in PMG model is true, Hausman test is used. If long-run relationship is homogeneous, namely, if the restriction in PMG model is true, the estimates are efficient and consistent. In opposite, PMG method provides inconsistent estimates. MG model assumes heterogeneous long-run equilibrium relationships, and provides consistent estimates in both cases. Short-run adjustments are heterogeneous in both models.

The source of data is World Economic Outlook (April 2019), namely, International Monetary Fund. Used software is Stata 13.

COMPARATIVE ANALYSIS OF FISCAL VARIABLES IN THE EUROPEAN UNION ECONOMIES VERSUS WEST BALKANS ECONOMIES

There is no doubt relating the diversity of fiscal behavior in group of European Union economies and West Balkans economies through the period of 1995-2018. Although the West Balkans economies are geographically surrounded by European Union member states, European perspective of these economies are determined by overall economic, structural and political reforms. West Balkans economies have passed the long way since the end of the 1990s till today and managed to make significant progress (about financial structure, see in Janković, 2019). According to the strategy to strengthen the European Union by 2025, Serbia and Montenegro could complete the accession process in a 2025 perspective, for Albania and North Macedonia the Commission is ready to prepare recommendations to open accession negotiations, while for Bosnia and Herzegovina, the Commission will give the opinion (European Commission 2018). Moreover, European Commission defined six flagship initiatives related to specific actions which

could improve their position in accession process. The specific interest in this paper is related to fiscal adjustments in West Balkans economies in comparison to European Union economies, and their progress in this field is estimated as follows by the European Commission for the year 2019: For Albania still remains essential to ensure effective, efficient and transparent functioning of public finance management; Bosnia and Herzegovina should adopt strategy for public administration and public finance management, and establish monitoring framework in order to ensure financial sustainability; in Montenegro is undertaken public financial management reform in 2018, however, budget transparency have to be ensured; North Macedonia improved public finance and transparency, however, composition of public expenditure worsened which threatens fiscal sustainability; Related to Serbia, it is emphasized weakness in public finance management and in defined fiscal rules, together with the need to improve competitiveness (Domazet, Zubovic and Lazic, 2018) .

Differences do not exist only between European Union economies and West Balkans economies. The fiscal balance could be used in order to measure differences among economies in the context of fiscal sustainability, and the range is from −32.5 % of GDP in the year 2010 in Ireland to 6 % of GDP in Luxemburg in the year 2006. It turns out that important differences already exist in the sample of EU members, and certainly between EU members vs. (potential) candidates' economies. Average fiscal balance per annum for all analyzed economies shows two years as extremes: 2007 - the lowest fiscal deficit was achieved (−0.2 % of GDP), and 2009 the highest fiscal deficit was achieved due to influence of global instability (−6.3 % of GDP). According to this, it is assumed heterogeneity within the sample and differences during the analyzed period.

Using data related to public expenditure and public revenues, the situation is as follow. In European Union members, public revenues share in GDP on average were stabile during analyzed period of time, while public expenditure share in GDP fluctuated (Figure 1). Namely, in the period before global instability, public expenditure in average decreased, and achieved fiscal balance in average in the year 2007. Global crisis caused higher indebtedness in the period 2008-2010, which accompanied with decrease of GDP in the years of global crisis determined sharp increase of public expenditure (7.7 p.p. in average of European Union members). In the period 2011-2018, fiscal balance positions of European Union member economies were improved. On the other hand, during analyzed period of time, West Balkans economies on average have experienced lower public revenues and public expenditure in comparison to European Union economies. Public expenditure share in GDP in West Balkans economies had similar path as in member states, while public revenues fluctuated more. This could be related to the fiscal reform in West Balkans economies.
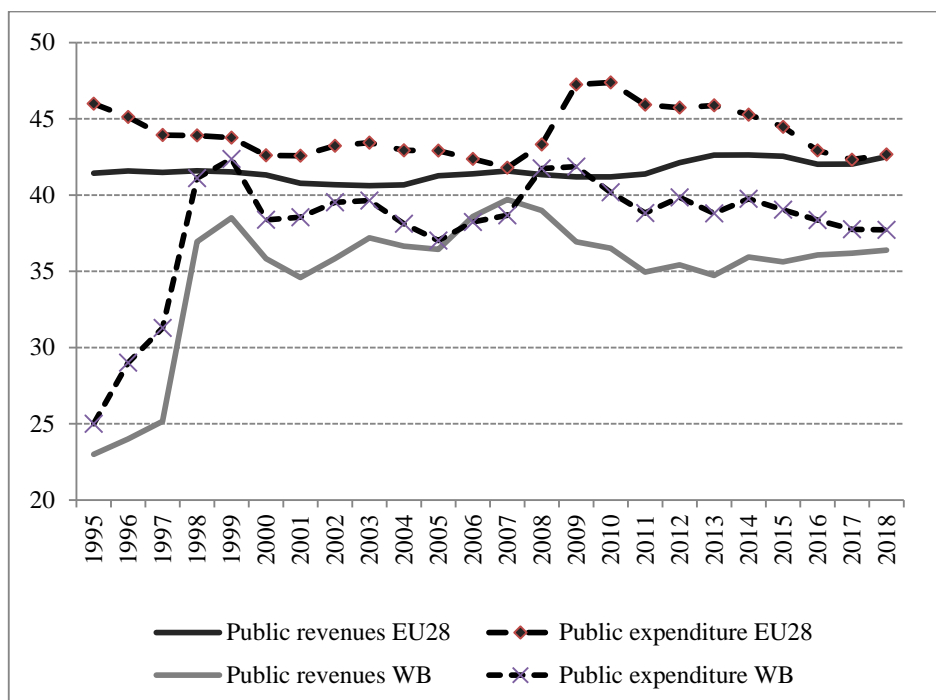
Figure 1. Public expenditure and public revenues in the group of European Union and West Balkans economies

Source: Authors.

Beside observed distinctions between European Union and West Balkans economies, profound analysis could indicate individual differences within each group. In European Union economies during the period 1995-2018, public revenues varied from 25.77 % of GDP in Ireland in 2018 to 57.341 % of GDP in Sweden in 1996, while average public expenditure fluctuated from 25.73 % of GDP in 2018 to maximum value of 65.046 % GDP in 2010 both in Ireland. Therefore, Ireland was the economy with the highest fluctuations of public expenditure in analyzed period of time. In the West Balkans economies fiscal revenues varied from 19.393 % of GDP in Albania in 1997 to 54.721 % of GDP in Bosnia and Herzegovina in 1999, and public expenditure from 28.229 % of GDP in Albania in 2012 to 57.503 % of GDP in Bosnia and Herzegovina in the year 1999. This indicates important differences between two groups of economies and within two groups, emphasizing that although all analyzed economies belong to European continent and all economies are member or in the accession phase to European Union, it is necessary to analyze specificities of each country's fiscal adjustments, namely, it is important to use heterogeneous coefficient in panel estimations.

TESTING FISCAL ADJUSTMENTS IN THE EUROPEAN UNION VERSUS WEST BALKANS ECONOMIES

Econometric framework for fiscal sustainability and fiscal adjustment estimation is selected taking into account potential problems of heterogeneity, nonstationarity, and cross-sectional dependency in the panel. In the beginning, Anova F-test and Welch F-test are used to test the variability for each economy for key variables. The results showed heterogeneity in analyzed sample in the most important fiscal sustainability variables (results are shown in Table 1). Next, cross-sectional dependency is tested using Pesaran CD test in the pre-estimation phase for all variables (Table 1), and results indicated that in all cases null hypothesis of cross-section independency has to be rejected. Detected dependency is expected due to the fact that all

economies in the sample are members of European Union or in the accession phase, and certainly linked by strong institutional framework (customs union, common market, common agricultural policy, tax harmonization, and finally, monetary union). Although a large degree of the competencies are directly related to the level of European Union, fiscal policy is not unified. Therefore, mechanisms of fiscal deficit reduction could not be the same, but given that it is directed by the same framework, the similarities must exist. This could explain the existence of cross-sectional dependency and heterogeneity in the model.

Table 1. Variability Testing in Countries and Pesaran CD Test

Variables	Anova F-test		Welch F-test		Cross-sectional dependency test			
	Test-stat.	p-value	Test-stat.	p-value	CD-test	p-value	Correlation	Aps. (corr.)
Fiscal deficit	7.22	0.000	13.1202	0.000	25.80	0.00	0.297	0.370
Public revenues	234.5	0.000	424.055	0.000	5.79	0.00	0.051	0.346
Public expenditure	95.82	0.000	165.78	0.000	24.02	0.00	0.213	0.342
Public debt	54.96	0.000	224.897	0.000	6.2	0.00	0.77	0.507

Source: Authors' calculation.

Cross-sectional dependency in the sample, conditioned the use of second generation panel unit root test – Pesaran CIPS test (2007). Westerlund and Prohl (2007) showed that inclusion of trend in the model when all variables are represented in the form of GDP share is redundant, so decisions are made on the basis of models with constant, and according to Akaike information criteria to determine optimal lag in model. Results of Pesaran CIPS test (Table 2) indicated that variables are nonstationary. Next, the stationarity of variables first differences is tested, and results of Pesaran CIPS test showed stationary of variables in first differences, namely, all variables in the model are integrated of order 1. Results of Pesaran's unit root test indicate assessment of fiscal sustainability, due to difference stationarity of fiscal deficit, while first order of integration of public revenues and public expenditure is the base for cointegration analysis.

Table 2. Pesaran unit root test

CIPS test $H_0: I(1);$ $H_1: I(0)$	Lags	Model with constant[a]			
		Level of variables		First difference of variables	
		$Z(\bar{t})$-statistika (CIPS)	p-value	$Z(\bar{t})$-statistika (CIPS)	p-value
Public revenues	0	-1.527	0.063	-22.596	0.000
	1	-2.546	0.050	-14.264	0.000
	2	1.355	0.912	-7.525	0.000
Public expenditure	0	-1.920	0.027	-20.617	0.000
	1	-0.824	0.205	-11.768	0.000
	2	-0.530	0.702	-7.098	0.000
Public debt	0	3.039	0.999	-15.115	0.000
	1	-0.154	0.288	-8.025	0.000
	2	2.956	0.987	-3.565	0.005

Source: authors' calculation.

Results based on Heterogeneous Panel Coefficients

According to the results of possible heterogeneity in the model, as well as cross-sectional dependency, the analysis is continued using Westerlund (2007) cointegration test, between variables integrated of order 1, public expenditure and public revenues. In application of Westerlund (2007) cointegration test an important assumption is related to the causality of variables. In the equation proposed in section related to hypothesis and methodology, causality is defined from public expenditure to public revenue, indicating uncompleted control of public expenditure, namely hypothesis "spend and tax". In order to check causality *nexus*, Granger causality test, and Dumitrescu-Hurlin (2012) test for heterogeneous causality in panels are undertaken (Table 3).

Table 3. Causality testing

Granger test			
Public expenditure doe not Granger cause public revenues	F- stat.	p-value	
	4.39461	0.0127	
Dumitrescu and Hurlin causality test in heterogeneous panels			
Public expenditure does not homogeneously cause public revenues	W-stat.	$\bar{Z}$- stat.	p-value
	3.72899	2.97950	0.0029

Source: Authors' calculation.

Results of Granger-Lee and Dumitrescu-Hurlin (2012) tests for heterogeneous causality in panels are presented in Table 3, indicating that causality goes from public expenditure to public revenues, and that heterogeneous causality exists. Therefore, Westerlund (2007) test is a good solution for cointegration testing, due to the fact that one of the assumptions of Westerlund test is existence of heterogeneous panels, and in this case, causality is heterogeneous and goes from public expenditure to public revenues.

Table 4. Westerlund (2007) cointegration test

Test	Values	Z-values	p-values	Bootstraped p-values
H_0: no cointegration				
H_1: at least one panel unit is cointegrated				
Gt	-1.989	-5.594	0.000	**0.023**
Ga	-7.214	-4.309	0.000	**0.013**
H_0: no cointegration				
H_1: all panel units are cointegrated				
Pt	-10.417	-6.412	0.000	**0.010**
Pa	-6.008	-9.885	0.000	**0.005**
AIC selected lag length: 1; AIC selected lead length: 2.				

Source: authors' estimation.

The results in Table 4 are for the assumption "spend and tax", while the lead and lag lengths structure are chosen using AIC criteria, for the model with constant. Due to the fact that cross-sectional dependency exists in panel, Westerlund (2007) test could provide relevant conclusion only after bootstrap procedure. Robust *p*-values are calculated using bootstrap procedure in 400 steps. Conclusion related to Westerlund test using group mean tests (Gt and Ga) and pooled panel tests (Pt and Pa) is that at least one panel unit is cointegrated or all panel units, and therefore is necessary to estimate heterogeneous coefficients with the intention to find out in which panel units (countries) exist cointegration, and in which countries not.

Mean Group and Pooled Mean Group methods are furthermore used to estimate long-run equilibrium relationship between public expenditure and public revenues, as well as short-run

fiscal adjustment to long-run relationship, according to empirical instructions proposed by Blackburne and Frank (2007). Table 5 represents only homogeneous coefficients in model. According to the results of homogeneous coefficients in both cases cointegration vector is significant and between 0 and 1: 0.496 in MG model and 0.475 in PMG model. Using Quintos (1995) terminology, these results indicate *weak* fiscal sustainability in European Union and West Balkans economies. In comparison of two methods, higher long-run coefficient is estimated for Mean Group method, as well as fiscal adjustment. Namely, fiscal adjustment in MG model is -0.3473, indicating that 34.73% of deviations are corrected in one year, while short-run fiscal adjustment in PMG model is -0.2818, showing that 28.18% of deviations are in average corrected in one year. However, Hausman test for long-run relationship homogeneity showed that PMG method provides optimal specification, with consistent and efficient estimates.

Table 5. Homogeneous coefficients of MG and PMG Estimators for European Union economies and West Balkans economies in the period 1995-2018

Dependent variable: log public revenues	Homogeneous long-run relationship (θ)		ΔlE		μ_i		Error correction (Φ_i)	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
MG	0.496121	0.000	0.07643	0.163	1.1432	0.000	-0.3473	0.000
	Weak fiscal sustainability							
PMG	0.475849	0.000	0.09007	0.009	0.83392	0.000	-0.2818	0.000
	Weak fiscal sustainability							
Hausman test for long-run relationship homogeneity								
Hausman test statistics	0.04							
p-value	0.8381							
ARDL (1,1)								

Source: Authors' estimations.

Tabela 6. Heterogeneous coefficients of PMG Estimator for European Union and West Balkans economies in the period 1995-2018

Dependent variable: log public revenues	Error-correction (Φ_i)		ΔlE		μ_i	
Countries	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
European Union economies						
Austria	-0.632	0.001	0.119	0.334	2.1402	0.002
Belgium	-0.345	0.000	-0.046	0.459	1.1779	0.001
Cyprus	-0.244	0.085	-0.427	0.009	0.7525	0.001
Estonia	-0.878	0.000	0.010	0.939	2.7521	0.000
Finland	-0.143	0.154	-0.012	0.847	0.5002	0.168
France	-0.247	0.020	-0.163	0.264	0.8461	0.022
Germany	-0.012	0.908	0.016	0.830	0.4448	0.906
Greece	-0.181	0.044	-0.089	0.770	0.6126	0.032
Ireland	-0.137	0.243	0.264	0.002	0.2931	0.367
Italy	-0.422	0.002	-0.009	0.936	1.4018	0.003
Latvia	-0.252	0.098	0.1853	0.100	0.6817	0.092
Lithuania	-0.164	0.225	0.1797	0.086	0.4190	0.173
Luxemburg	-0.101	0.307	0.1496	0.004	0.3542	0.312
Malta	-0.202	0.040	-0.240	0.196	0.5840	0.041
Netherlands	-0.174	0.141	-0.059	0.473	0.5715	0.151
Portugal	-0.312	0.001	-0.304	0.040	0.9839	0.001
Slovak Republic	-0.256	0.044	0.3095	0.012	0.7167	0.050

Slovenia	-0.459	0.017	-0.0681	0.521	1.4587	0.025
Spain	-0.228	0.024	-0.547	0.008	0.648	0.034
Bulgaria	-0.286	0.046	0.1345	0.251	0.8122	0.046
UK	-0.076	0.491	-0.278	0.045	0.2322	0.406
Croatia	-0.406	0.017	0.7084	0.001	1.2804	0.021
Hungary	-0.237	0.037	-0.1668	0.277	0.7651	0.043
Poland	-0.403	0.023	0.3739	0.123	1.2206	0.025
Romania	-0.361	0.023	0.255	0.039	0.7091	0.032
Czech Republic	-0.184	0.087	0.2534	0.048	0.5811	0.176
Denmark	-0.194	0.050	-0.410	0.594	0.6744	0.061
Sweden	-0.218	0.048	-0.011	0.901	0.7521	0.052
West Balkans economies						
Albania	-0.451	0.010	0.775	0.001	0.5200	0.034
Bosnia and Herzegovina	-0.157	0.276	0.224	0.040	0.5268	0.284
Montenegro	-0.381	0.007	0.643	0.000	1.2177	0.008
North Macedonia	-0.438	0.003	0.203	0.115	0.9835	0.006
Serbia	-0.193	0.412	0.630	0.000	0.3020	0.402

Source: authors' estimation.

PMG estimates show that exist significant long-run equilibrium relationship in the sample (European Union and West Balkans economies in period 1995-2018), and *weak* fiscal sustainability (Table 5). According to error-correction in the model, 28.18 % of deviation from equilibrium is in average corrected in one year. Table 6 shows heterogeneous fiscal adjustments estimated by PMG method. Based on results, fiscal adjustments are the highest in Estonia and Austria, while the most weak but significant fiscal adjustment is estimated for Greece. Although with expected sign, fiscal adjustments are not significant in some economies in the sample, which could be interpreted differently. For instance, in Germany and Luxemburg, fiscal adjustment in terms of public expenditure adjustments to long-run equilibrium relationship, is not significant because of existence of opposite hypothesis in this economies, "tax and spend", and higher average public revenues in comparison to average public expenditure. In other economies it could be due different fiscal policy framework (welfare state such as Finland), or because of the influence of global instability (Ireland). For West Balkans economies individual fiscal adjustments are more intensive than average fiscal adjustment, namely, 45.1% in Albania, 38.1% in Montenegro, 43.8% in North Macedonia, showing that West Balkans economies have some progress in the period 1995-2018 related to fiscal adjustments and stabilization of public finances. Results indicated that fiscal adjustments for Serbia and Bosnia and Herzegovina are not significant. This result for Serbia is in line with the paper of Andrić, Arsić, and Nojković (2016) which showed that corrective actions of government in Serbia were insufficient before and after global crisis, and provided empirical support to the fiscal fatigue hypothesis. For the Bosnia and Herzegovina, in the report for 2019, European Commission estimated fiscal policy as vulnerable to inefficiency and waste, and emphasized need for fiscal adjustments, especially in building-up sufficient fiscal buffers.

The relevance of the results is analysed by robustness check in time dimension by reduction in the analysed period. Years 1995 and 1996 are excluded from the model, in order to test robustness and whether introduction of Stability and growth pact in 1997, significantly changed results. Estimated model is presented in Appendix (Tables 1a and 2a) and confirms validity of the results - heterogeneous fiscal adjustments and weak fiscal sustainability in European Union and West Balkans economies. Average fiscal adjustment is higher in comparison to the baseline model, namely, 30.34% of deviations are corrected in one year, meaning convergence after the adoption of Stability and growth pact in 1997.

Finally, it is concluded that Hypothesis 1 and 2 are confirmed: *weak* fiscal sustainability exists in the panel of European Union and West Balkans economies according to homogeneous

coefficients, while fiscal adjustments to long-run equilibrium relationship are heterogeneous in the sample; namely in some economies fiscal adjustments are negatively and significant with different magnitude of influence, while in others is defined ad hock.

CONCLUSION

This paper empirically assesses heterogeneity of fiscal adjustments in European Union and West Balkans economies, in the circumstances when debt crisis renewed questions when and how governments adjust their public expenditure. The research covers panel of 28 European Union economies and 5 West Balkans economies over the period 1995-2018. The paper operates within non-stationary, heterogeneous panels using flow relationship. The results based on PMG model point to *weak* fiscal sustainability and that in average 28.18 % of deviation from equilibrium relationship is corrected in one year. Moreover, the results provide heterogeneous evidence of public expenditure adjustments to long-run equilibrium relationship in European Union and West Balkans economies. The highest significant values are estimated in Austria and Estonia, and the lowest significant value in Greece, while fiscal adjustments are insignificant in some economies, due to influence of global instability or fiscal policy framework. Results showed that accession process for West Balkans economies does not lead to automatic convergence of countries and fiscal sustainability assessment, although significant fiscal adjustments are noted in Albania, Montenegro and North Macedonia. Robustness check in time dimension indicated better fiscal discipline after introduction of Stability and Growth Pact in 1997, emphasizing importance of supranacional fiscal rules.

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APPENDIX

Table 1a. Robustness check: PMG Estimator for European Union and West Balkans economies in period 1997-2018

Dependent variable: log public revenues	Homogeneous long-run relationship (θ)		ΔlE		μ_i		Error correction (Φ_i)	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
MG	0.46855	0.000	0.0485	0.347	1.2827	0.000	-0.3672	0.000
PMG	0.28402	0.000	0.10185	0.059	1.3888	0.000	-0.3034	0.000
Hausman test for long-run relationship homogeneity								
Hausman test statistics		0.27						
p-value		0.3120						
ARDL (1,1)								

Source: Authors' estimations.

Tabela 2a. Robustness check: Heterogeneous coefficients of PMG Estimator for European Union and West Balkans economies in the period 1997-2018

Dependent variable: log public revenues	Error-correction (Φ_i)		ΔlE		μ_i	
Countries	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
European Union economies						
Austria	-0.6080	0.001	0.248	0.025	3.1661	0.001
Belgium	-0.225	0.099	0.0311	0.444	1.1865	0.097
Cyprus	-0.227	0.005	-0.479	0.079	1.0475	0.002
Estonia	-0.460	0.011	0.298	0.018	2.1045	0.011
Finland	-0.703	0.000	-0.083	0.166	3.7644	0.001
France	-0.059	0.558	-0.417	0.796	0.3147	0.554
Germany	-0.135	0.349	0.0235	0.755	0.6911	0.348
Greece	-0.201	0.091	-0.149	0.693	0.6126	0.032
Ireland	-0.076	0.526	0.295	0.000	0.2109	0.656
Italy	-0.197	0.137	0.1522	0.161	1.1011	0.136
Latvia	-0.168	0.170	0.232	0.026	0.6762	0.170
Lithuania	-0.157	0.248	0.1191	0.117	0.5995	0.220
Luxemburg	-0.294	0.050	0.1281	0.006	1.5122	0.051
Malta	-0.285	0.010	-0.062	0.722	1.3007	0.009
Netherlands	-0.288	0.072	-0.067	0.458	1.4340	0.071
Portugal	-0.268	0.013	-0.266	0.097	1.3196	0.012
Slovak Republic	-0.214	0.083	0.3711	0.003	0.9347	0.084
Slovenia	-0.909	0.000	-0.0542	0.460	4.3751	0.000
Spain	-0.350	0.008	-0.572	0.006	1.5689	0.009
Bulgaria	-0.245	0.086	0.1936	0.104	0.9923	0.087
UK	-0.400	0.002	-0.416	0.001	1.6591	0.001
Croatia	-0.371	0.032	0.779	0.000	1.8821	0.033
Hungary	-0.205	0.088	-0.175	0.224	1.0348	0.089
Poland	-0.548	0.005	0.2833	0.264	2.5643	0.006
Romania	-0.401	0.017	0.260	0.015	1.2981	0.016
Czech Republic	-0.190	0.311	0.234	0.181	0.9165	0.299
Denmark	-0.282	0.077	-0.405	0.606	1.5071	0.079
Sweden	-0.153	0.104	-0.028	0.763	0.8064	0.107
West Balkans economies						
Albania	-0.488	0.005	0.376	0.046	0.999	0.002
Bosnia and Herzegovina	-0.279	0.288	0.244	0.007	1.4301	0.008

Montenegro	-0.318	0.011	0.722	0.000	1.5587	0.012
North Macedonia	-0.264	0.085	0.580	0.643	0.860	0.101
Serbia	-0.030	0.751	0.686	0.000	0.1528	0.738

Source: authors' estimation.