

An analysis of COFOG expenditures in former Yugoslavian countries

MARKO CRNOGORAC, Ph.D.*
SANTIAGO LAGO-PEÑAS, Ph.D.*

Article**

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Marko CRNOGORAC

Governance and Economics Research Network (GEN), Universidade de Vigo, Campus Universitario As Lagoas s/n,
32004 Ourense, Spain
e-mail: mcrnogorac@uvigo.es
ORCID: 0000-0002-5302-2081

Santiago LAGO-PEÑAS

Governance and Economics Research Network (GEN), Universidade de Vigo, Campus Universitario As Lagoas s/n,
32004 Ourense, Spain
e-mail: slagop@uvigo.es
ORCID: 0000-0003-4601-8655



Abstract

In this paper, we carry out an in-depth analysis of public expenditure in all former Yugoslavian countries. Our purpose is threefold: first, to verify the existence of common patterns of spending; second, to investigate the cyclicity hypothesis of fiscal policy in non-OECD countries; and third, to analyse both political and economic determinants of expenditure composition. Our results show a weak convergence in structures, the countercyclical behaviour of public expenditures, and the influence of electoral cycles, business cycles, and the degree of nationalization of party systems on the composition of public expenditure.

Keywords: COFOG expenditures, former Yugoslavia

1 INTRODUCTION

Former Yugoslavian countries (Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia, Serbia, and Slovenia) are all at different stages of the process of integration into the European Union (EU). While fiscal variables are a key issue for that process, related literature, both academic and policy-oriented, is rather limited. We consider the possibility of comparing evolutions from a common starting point, the dissolution of former Yugoslavia, as a type of natural experiment. The idea is to use the sequential acts of secession as a clearly defined cause that might change the outcomes of managing public expenditures from country to country. Our objective would be to assess whether the policies would converge or diverge post secession, as well as to provide conclusions explaining the fiscal behaviour.

In the past few years, we have contributed to a partial filling of the gap. Crnogorac and Lago-Peñas (2019a) analysed fiscal policy from the perspectives of the evolution of the main fiscal aggregates, composition of tax revenues, and budget elasticity in relation to the economic cycle. The focus was on the main aggregates of public deficit, revenues, and expenditures. Although data constraints allowed public revenues to be explored in more detail than public expenditures, we concluded that fiscal policies are driven by the spending component. Furthermore, in Crnogorac and Lago-Peñas (2019b) we focused on tax evasion and in Crnogorac and Lago-Peñas (2020) we analysed the determinants of tax morale as factors explaining tax evasion in the former Yugoslavian countries.

The focus of this paper is on public expenditure. In particular, we deal with the lack of publicly available data on COFOG¹ categories in Western Balkan countries to build a database facilitating new empirical research on public expenditure convergence, cyclicity, and the determinants of public spending choices. This paper takes a cross-country perspective dealing with the main fiscal aggregate, expenditures, instead of focusing on single country issues, like most recent literature. To the best

¹ The Classification of the Functions of Government (COFOG) by the United Nations (2000) is a current functional disaggregation of total general government expenditures into 10 categories.

of our knowledge, this is the first comprehensive and quantitative analysis of public expenditures in former Yugoslavian countries covering those dimensions. In more detail, our first target is to explore whether there are common patterns in spending among the sample countries, using both convergence and cluster analysis. Second, we analyse the impact of the economic cycle on overall public expenditures and each of their COFOG categories, as we did in work (Crnogorac and Lago-Peñas, 2019a) for revenue categories. Third, we shed light on the economic and political determinants of the composition of public expenditures.

The rest of the paper is organized as follows: section 2 deals with the convergence of public expenditures and their COFOG categories. Section 3 analyses whether the economic cycle is relevant in explaining the dynamics of the functions of public expenditures in the context of recent literature on developed and developing countries. Section 4 provides an estimate of the determinants of three aggregates of COFOG categories based on multiple specifications from recent literature. Section 5 concludes, providing the most relevant findings.

2 THE EVOLUTION OF PUBLIC EXPENDITURE IN FORMER YUGOSLAVIAN COUNTRIES

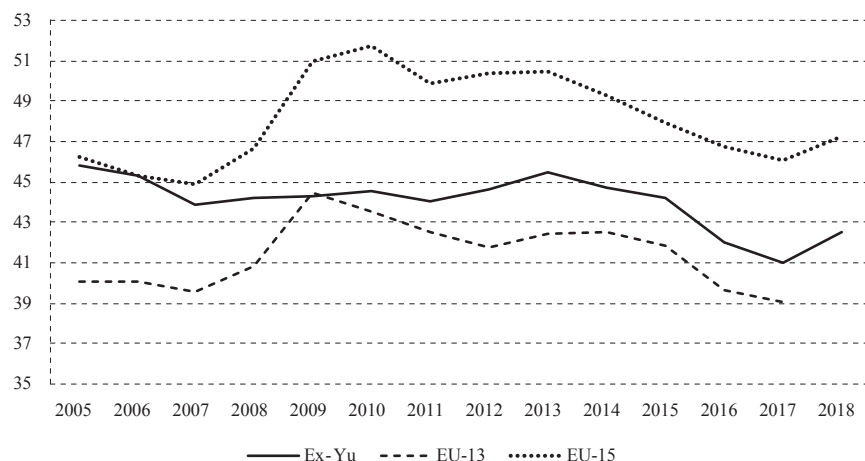
The current disaggregation of total general government expenditure by function was established in 1999. While only developed countries collected and presented data this way from the start, the COFOG methodology has spread progressively. All former Yugoslavian countries joined this trend in recent years. Reforms in many areas on their paths to join the EU have involved relevant advances in statistical data collection, including information on public expenditure. The only previous study to include at least partial data for the functional structure of the six former Yugoslavian countries is Afonso and Jalles (2014). Its sample of 155 countries included the six countries where the analysis was focused on only three specific COFOG categories: education, health, and social security. Moreover, because of their memberships of international organisations, Slovenia and Croatia have been included in other cross-sectional studies concerning public expenditure (Hessami, 2014; del Granado, Martinez-Vazquez and McNab, 2018), but a specific focus on them is lacking.

In order to analyse the evolution of public expenditures over time, we conduct several complementary analyses using a data sample² of six former Yugoslavian countries between 2011 and 2019, which we complement with other countries, depending on the analysis. The sample size is limited by the lack of data on all the countries in previous years, as well as the intention of the authors to exclude data post 2020 due to extensive shocks on the expenditure side. First, we turn to expenditure compositions in order to observe if common patterns exist among the six former Yugoslavian countries and the average of core EU countries, replacing

² The authors thank the D.1 unit-candidate and pre-candidate countries of DG ECFIN of the European Commission for its help in obtaining some of the data used in this research as well as the contributing institutions of the sample countries who participated in our data-collection process.

GDP with total expenditures in the denominator in order to control for differences in the level of expenditure ratios and focus on the structure of expenditures. The purpose of this analysis is to verify whether our sample countries have similarities in terms of expenditures with EU members, starting with the best-performing. Second, after obtaining conclusions on divergence in the descriptive analysis, we pool the former Yugoslavian countries with new EU member states for a cluster analysis to confirm whether there are identifiable common patterns among lower-performing EU member states. On average, these two groups of countries have similar expenditure shares over GDP and trajectories over time (figure 1), which makes them more suitable for pooling in a cluster analysis. Third, in the last stage of the convergence analysis, we use an analysis analogue to a β -convergence, where we look solely at the former Yugoslavian countries.

FIGURE 1
Public expenditure as a share of GDP (%)



2.1 COMPOSITION OF PUBLIC EXPENDITURES

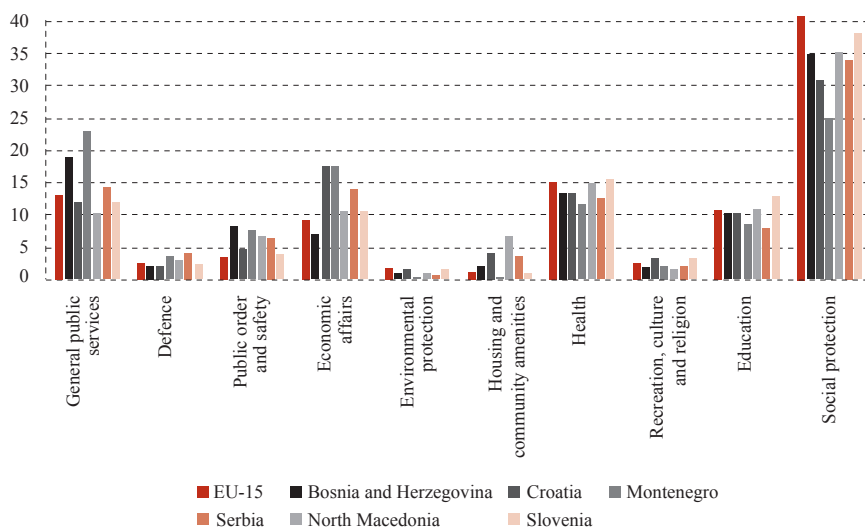
Firstly, we compare the figures for each former Yugoslavian country with the average of the EU-15³ countries in 2019. To focus on the composition of public expenditure controlling for differences in the size of total public expenditure, figures over total expenditures are used now. Social Protection expenditures in former Yugoslavian countries are below the average of EU-15 countries. Concerning Health expenditures, most of them follow the EU average, except for Montenegro. The remaining two-digit expenditure items are General Public Affairs and Education. Bosnia and Herzegovina, Montenegro, and Serbia seem to deviate from the core EU average by having higher expenditures on the former and lower on the latter. In terms of Economic Affairs, all former Yugoslavian countries except for Bosnia and Herzegovina exceed the EU-15 average. This category is the heart of

³ The EU-15 countries, also known as core EU countries, are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom.

productive spending,⁴ which is inherent to developing countries. Another indicator of overspending in the public sector is the Public Order and Safety category in all countries except Slovenia. Similarly, Housing expenditures are well above the EU-15 average, except in Slovenia and Montenegro. All former Yugoslavian countries spend below the core EU average on Environmental Protection, indicating that environmental awareness should be increased. Defence expenditures and Recreation, Culture, and Religion expenditures in former Yugoslavian countries seem to have the smallest deviations from the EU-15 averages.

FIGURE 2

Expenditure categories as a share of total expenditures in 2019, former Yugoslavian countries vs core EU countries (EU-15), %



2.2 CLUSTER ANALYSIS

We merge the countries of interest with a set of EU-13 countries⁵ to perform a cluster analysis and test whether common patterns in financial efforts made in the different areas of expenditure can be detected. Hence, the final sample includes 17 countries, of which 13 are new EU member states. The remaining four are former Yugoslavian countries, while Slovenia and Croatia are listed among the new EU member states since they joined in 2004 and 2013, respectively. We focus on both total expenditure and its disaggregation in 10 functions.⁶ In all cases, figures are expressed as a share of GDP. If common patterns among former Yugoslavian countries are strong enough, the existence of a cluster inside the pool should be reflected, despite

⁴ The category mainly includes labour, agriculture, forestry, fishing, fuel, energy, mining, manufacturing, construction, transport, communication, other industries, and R&D.

⁵ EU-13 is a group of 13 countries that have joined the EU since 2004: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, and Slovenia.

⁶ The 10 expenditure categories as per COFOG are: General Public Services; Defence; Public Order and Safety; Economic Affairs; Environmental Protection; Housing and Community Amenities; Health; Recreation, Culture and Religion; Education; and Social Protection.

the difference in degrees of EU integration among former Yugoslavian countries. The computations were made using the Stata 14 statistical package.

We perform two cluster analyses for the first (2011) and final (2019) years of available data. Computations use the average linkage clustering method and Euclidean distance as the similarity or dissimilarity measure. The corresponding dendrograms are presented in figures 3 and 4. Results for 2011 show that former Yugoslavian countries are not grouped in one specific cluster. The same picture emerges in 2019. In short, there are significant differences in the composition of public expenditure across countries and they do not clearly tend to decrease (or increase) over time.

FIGURE 3
Dendrogram of cluster analysis for 2011

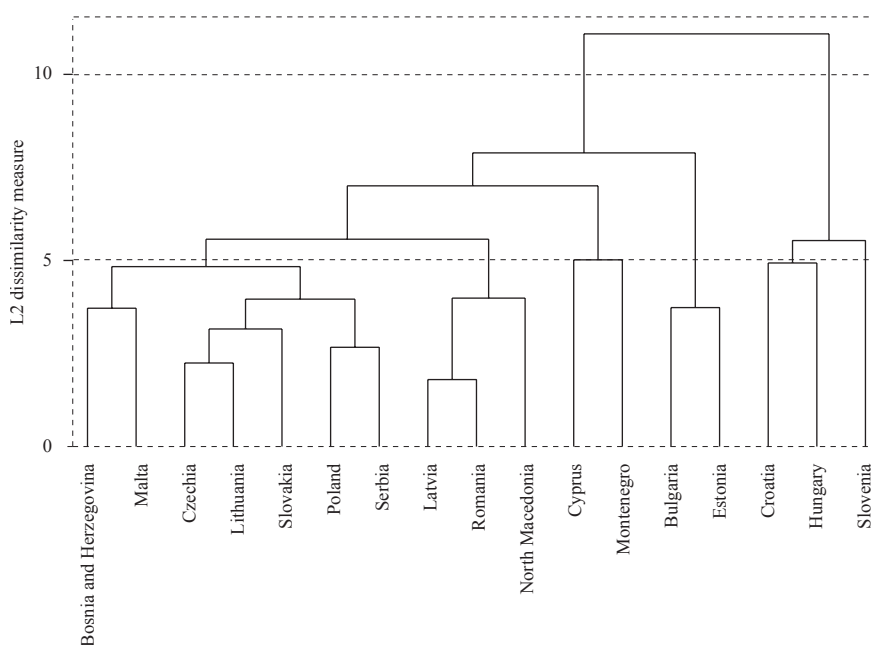
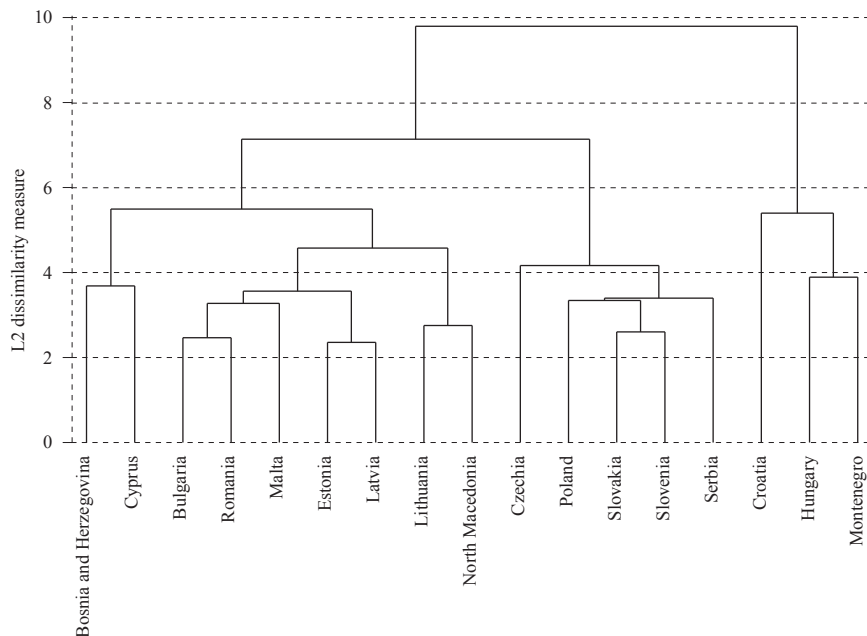


FIGURE 4

Dendrogram of cluster analysis for 2019



2.3 CONVERGENCE ANALYSIS

In order specifically to test convergence in public expenditures among the six former Yugoslavian countries, we rely upon the concept of β -convergence (Sala-i-Martin, 1996). However, the methodology of Sala-i-Martin (1996) is not followed *strictu sensu* since we do not employ log values, and rather use ratios of expenditure over GDP. Namely, we analyse convergence by relating variations in the corresponding ratio on the starting point. We focus again on both total expenditure and its disaggregation into 10 functions in terms of GDP. The panel dataset is balanced, with the initial year of the time series being 2011 and the final one 2019. The benchmark specification is the following one, where E – public expenditures over GDP; t – current year; α – constant term:

$$E_t - E_{t-1} = \alpha + \beta \times E_{t-1} + \varepsilon_t \quad (1)$$

Convergence is confirmed when the coefficient on the lagged expenditure is negative and significant, meaning lower starting values tend to involve higher increases in the ratio, and vice versa. The main results are reported in table 1. There is statistically significant convergence in seven categories and non-significant convergence in the remaining three. Overall government expenditures are convergent at a marginal significance, with a p-value of 0.10. In sum, there is empirical evidence of limited convergence of expenditures among former Yugoslavian countries.

TABLE 1
β-convergence in public expenditure

	Total expenditures	General public services	Defence	Public order and safety	Economic affairs	Environmental protection
Intercept	4.35 (1.55)	0.77 (1.8)*	0.22 (2.47)**	0.13 (1.18)	2.96 (3.93)***	0.05 (1.55)
Et-1	-0.11 (1.67)	-0.11 (1.8)*	-0.21 (2.92)***	-0.06 (1.6)	-0.54 (4.25)***	-0.16 (2.21)**

	Housing and community amenities	Health	Recreation, culture and religion	Education	Social protection
Intercept	0.04 (0.61)	0.95 (2.28)**	0.08 (2.11)**	0.17 (0.92)	0.84 (1.47)
Et-1	-0.04 (0.75)	-0.17 (2.35)**	-0.1 (2.98)***	-0.06 (1.36)	-0.07 (1.74)*

Obs.: 53; Method: OLS.

*Note: ***, **, * indicate statistical significance at 1%, 5% and 10%, respectively. T-statistics computed using OLS residuals is reported in parenthesis.*

3 SENSITIVITY OF PUBLIC EXPENDITURE TO THE ECONOMIC CYCLE

The literature on the cyclicity of fiscal policy makes a clear distinction between developing and developed countries. In a seminal paper, Gavin and Perotti (1997) argued that fiscal policies tend to be countercyclical in industrial (developed) countries and procyclical in developing countries. The main conclusion to be drawn from recent literature is that developing countries always tend to have a more procyclical fiscal policy than developed countries. Although developed countries are usually characterized by countercyclical fiscal policy, they may have a procyclical fiscal policy as well. However, the procyclical effect of the business cycle on fiscal policy is always stronger in developing countries.

Viren (2014) analysed EU-15 countries over the period 1970-2011 to find that expenditure elasticities with respect to output growth appear at -0.58 for a one-year horizon. Furthermore, in the analysis of Mourre, Astarita and Princen (2014), expenditure elasticity for European countries is also negative at -0.50. Both results are negative, suggesting countercyclicity. Égert (2014) found that discretionary fiscal policy in OECD countries is neutral or mildly countercyclical. Balassone and Kumar (2007) also used a mixed sample of industrial and developing countries between 1975-1997 to find clear evidence of how policy tends to be a cyclical or mildly countercyclical in bad times but procyclical in good times. Nevertheless, there is evidence that in many emerging market countries, fiscal policy is procyclical in bad times as well. They argue that this is due to inaccurate assessments of the economic cycle as well as a lack of access to external financial markets in crisis times, when funding is needed to exercise a countercyclical policy. The latter point was made first by Gavin and Perotti (1997), who claimed it was easier for developed countries to adopt expansionary fiscal policies during recessions

(countercyclical) due to better access to financial markets. Inchauste et al. (2004), using data for 51 developing countries around the world between 1970 and 2002, confirmed that there is little scope for countries with high financial risks to undertake countercyclical fiscal policies.

When it comes to developing countries, results usually imply procyclicality. However, there are a limited number of studies solely exploring these countries. An exception is the work of Alesina, Campante and Tabellini (2008), who analyse 87 countries, where in many developing countries fiscal policy is procyclical. Furthermore, the procyclicality is driven by expenditures rather than revenues. Usually, the cyclicity of fiscal policy in developing countries is analysed within larger samples. The procyclical effect in large samples was first decomposed by Kaminsky, Reinhart, and Végh (2004), who found that fiscal policy was procyclical among low- and middle-income countries. Jaimovich and Panizza (2007) confirmed their findings. Although they found fiscal policy to be procyclical for all 118 developing and industrial countries in their sample over the 1970–2003 period, they did make one very clear differentiation. The strongest procyclical behaviour was found in low-income countries, with a statistically significant coefficient of 1.49, followed by middle-low income countries, and the lowest coefficient of 0.31 for procyclical fiscal policy was found in middle–high income countries. Ilzetzi and Vegh (2008) confirm the previous findings by using quarterly data from Q1 1960 to Q4 2006 for 27 developing and 22 high-income countries. Procyclicality in public spending is present in developing countries and, moreover, there is evidence of reverse causality. The procyclical spending in developing countries implies that fiscal policy influences the business cycle negatively. Dabla-Norris et al. (2010) also confirm expenditure procyclicality in countries with low-quality budget institutions, while they find the same procyclicality to be lower in countries with high-quality budget institutions.

Concerning the mixed sample of former Yugoslavian countries, the expenditures have been shown to be countercyclical. The output gap elasticity values with respect to expenditures are pronounced, being at -1.27 or -1.20, depending on the estimate (Crnogorac and Lago-Peñas, 2019a). Similar findings were discovered by Arčabić and Banić (2021), who confirmed that Croatian policymakers try to keep fiscal policy both sustainable and countercyclical, but only in expansionary times.

We apply the same methodology when analysing the sensitivity of public finance, which is a simple and frequently used one for computing elasticities. The output gap, computed using the Hodrick and Prescott (1997) filter with the parameter k set at 4 according to the Ravn and Uhlig (2002) frequency rule, is chosen as a measure of the economic cycle. The variable was expressed through a mathematical statement as: GDP series over the filtered GDP series, minus 1, in brackets, and multiplied by 100. We used the GDP deflator in order to obtain figures in constant prices and avoid distortion by inflation. The panel dataset is unbalanced, starting in 2005 and ending in 2019. Hence, the econometric specification to be estimated is the following:

$$E_i = \alpha_i + \beta \times \text{output gap}_{it} + \rho \times E_{i,t-1} + \varepsilon_{it} \quad (2)$$

where E is the category of expenditure analysed, α is for country fixed effects, β is the coefficient of the independent variable, ρ_i is the coefficient of the lagged dependent variable, and ε_{it} is the random error. Both public expenditure and the output gap are expressed as ratios over GDP.

The analysis was performed using the ordinary least square (OLS) estimators. However, this method may lack in a relevant shortcoming regarding endogeneity. Including a lagged dependent variable alongside fixed effects may lead to the so-called Nickell bias (Nickell, 1981), which is of the order $1/T$. Since T is not very small in the case of our sample, we turn to a panel GMM estimator.⁷ Several specification tests were performed to check the robustness of the results to potential endogeneity of the output gap in OLS and GMM estimators. Regarding the redundancy of both individual and period fixed effects, the corresponding tests confirmed the relevance of individual fixed effects, while period fixed effects could be omitted. Cross-section slope homogeneity was tested using a Wald test, which assumes common slopes in the null hypothesis. There is no cross-country homogeneity, confirming the previous conclusion from the convergence and cluster analyses that convergence in expenditures does not hold over time. The null hypothesis of the Pesaran-CD test that the error component may be cross-sectionally correlated is rejected (p value = 0.14). The Breusch-Godfrey test of AR(1) autocorrelation shows that it is not a serious concern. Taking into account the small N dimension of the panel dataset, we employed both the Hansen and the Arellano-Bond AR(2) autocorrelation tests in the GMM estimate. The test outcomes validate the results, meaning instruments are uncorrelated with the error term and there is no autocorrelation. The main results, obtained through equation (2), are reported in table 2.

Firstly, it is shown that the ratio of expenditures to GDP is negatively influenced by the economic cycle. The negative value of the coefficient implies a countercyclical fiscal policy in the considered period. GMM estimates support the OLS results. Secondly, after replacing the total expenditures in equation (1) with their COFOG categories, we find the output gap is significant in only three categories: Health, Education, and Social Protection. Together, these amount to a 57% share of total expenditures over the period (13, 11, and 33% respectively). The coefficient on Social Protection expenditures is significant and negative, confirming the countercyclicality. We could argue that Social Protection expenditures decrease when the output gap is positive, because employment is higher in good economic times. Coefficients on Health and Education expenditures are lower in intensity

⁷ In preliminary estimates, we also tried to use the maximum likelihood with structural equation modelling (ML SEM). This estimator is employed only with balanced panels where T is relatively small (e.g. less than 10) and there are no missing data (Allison, Williams and Moral-Benito, 2017; Moral-Benito, Allison and Williams, 2019). It could be used to replace GMM with datasets where N is less than 100. However, the shortness of the sample caused lack of convergence in estimates.

and marginally significant. This can be justified by the nature of these expenditures, since the healthcare and education systems imply the existence of long-term strategies that do not sustain frequent changes. The results concerning these categories go in hand with the socialist history of the sample countries, Yugoslavia being a strong welfare state. Thirdly, three categories show ambivalent results regarding coefficient significance across the OLS and GMM estimates: General Public Services; Public Order and Safety; and Recreation, Culture, and Religion.

TABLE 2
Estimate of equation 1

Method	Total expenditures		General public services		Defence		Public order and safety	
	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
Output gap	-0.55 (-3.01)***	-0.67 (-4.11)***	-0.12 (-1.56)	-0.14 (-2.28)**	0.02 (1.4)	0.03 (1.49)	-0.02 (-1.24)	-0.03 (-2.41)**
Lagged endogenous	0.37 (3.11)***	0.33 (7.33)***	0.5 (4.73)***	0.66 (3.71)***	0.77 (10.21)***	0.74 (7.84)***	0.63 (6.55)***	0.61 (3.14)***
R2	0.85		0.87		0.82		0.93	
Individual fixed effects	Yes (0.0009)		Yes (0.008)		Yes (0.0717)		Yes (0.0297)	
Period fixed effects	No		No		Yes (0.0772)		No	
Wald	0.0118							
Pesaran CD	0.1350							
B-G test	0.8532							
Hansen test		0.3052		0.6803		0.6356		0.7494
A-B AR(2)		0.3101		0.6226		0.1620		0.1576
Observations	64	58	64	58	64	58	64	58
Method	Economic affairs		Environmental protection		Housing and community amenities		Health	
	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
Output gap	-0.07 (-0.48)	0.06 (0.51)	0.002 (0.22)	0.001 (0.15)	-0.01 (-0.45)	0.01 (0.27)	-0.07 (-2.57)**	-0.1 (-5.61)***
Lagged endogenous	0.2 (1.59)	0.1 (0.68)	0.24 (2.16)**	0.48 (3.09)***	0.35 (3.13)***	0.3 (1.79)*	0.42 (3.56)***	0.12 (0.82)
R2	0.45		0.88		0.94		0.79	

Method	Economic affairs			Environmental protection			Housing and community amenities			Health	
	OLS	GMM		OLS	GMM		OLS	GMM		OLS	GMM
Individual fixed effects	Yes (0.0128)			Yes (0.0000)			Yes (0.0000)			Yes (0.0029)	
Period fixed effects	No			No			No			No	
Hansen test		0.8943			0.0810			0.1551			0.2843
A-B AR(2)		0.2414			0.2150			0.8262			0.1292
Observations	64	58		64	46		64	58		64	58
Method	Recreation, culture and religion			Education			Social protection				
	OLS	GMM		OLS	GMM		OLS	GMM		OLS	GMM
Output gap	-0.004 (-0.33)	-0.01 (-2.7)**		-0.03 (-1.68)*	-0.03 (-2.23)**		-0.21 (-3.65)***	-0.27 (-1.96)*			
Lagged endogenous	0.59 (5.08)***	0.34 (4.04)***		0.72 (9.04)***	0.74 (14.52)***		0.5 (4.45)***	0.23 (0.86)			
R ²	0.92			0.94			0.93				
Individual fixed effects	Yes (0.0513)			Yes (0.0484)			Yes (0.0051)				
Period fixed effects	No			No			No				
Hansen test		0.0921			0.0662			0.4226			
A-B AR(2)		0.3618			0.5178			0.1556			
Observations	64	46		64	58		64	46			

Note: Redundancy F-test p-values for individual fixed effects and period fixed effects is reported in respective parenthesis. ***, **, * indicate statistical significance at 1%, 5% and 10%, respectively. T-statistics computed using OLS residuals is reported in parenthesis. Instruments in GMM are constructed for the lagged dependent variable from the second and third lagged values in the form of differences in all estimates, except for Health, Environmental protection and Recreation, culture and religion where we use the third and fourth lagged values. Additionally, third and fourth lagged values in the form of levels are applied as instruments for Recreation, culture and religion, Environmental protection and Social Protection. Lastly, period fixed effects are applied in the case of Housing and community amenities, Environmental protection and Social Protection.

4 ON THE DETERMINANTS OF EXPENDITURE COMPOSITION

The aim of our last analysis is to shed new light on the determinants of the composition of public expenditures in former Yugoslavian countries. As a first step, we revise the existing literature in order to discover which would be the best determinants of expenditure functions. In table 3 below, we have synthesized some of the most relevant recent articles that analysed the determinants of COFOG expenditures. Some of the papers define the endogenous variables as a share of total expenditures (del Granado, Martinez-Vazquez and McNab, 2018; Cordis, 2014; Hessami, 2014; Enkelmann and Leibrecht, 2013; Lago-Peñas and Lago-Peñas, 2009), while others choose to define them as a share of GDP (Mauro, 1998; Ferreiro, Garcia-Del-Valle and Gomez, 2009). Most of the papers focus on one or several variables of interest, such as corruption, decentralization, GDP, or electoral and political variables. Concerning control variables, the most usual are ageing, population size, unemployment rate, and total expenditures.

TABLE 3
Specifications of models estimating determinants of expenditure functions

Dependent variable	Independent variable of interest	Controls	Source
education (ratio of education expenditures to total public expenditures)	decentralization (share of local to total exp)	population population density age structure gross domestic product (GDP) per capita openness to international trade OECD membership dummy	del Granado, Martinez-Vazquez and McNab (2018)
health (same and composition (ratio of education and health expenditures to total public expenditures)	corruption convictions	log of state population the log of real state gross domestic product (GDP) per capita the percentage of state population aged 25+ with at least a high school diploma the percentage of state population between ages 0-17	Cordis (2014)
expenditure share in total expenditures	corruption perception index	interest rate on government bonds the population density the age-dependency ratio the log of real GDP per capita and the unemployment rate regional dummies for the South, the Midwest, and the West	Hessami (2014)

Dependent variable	Independent variable of interest	Controls	Source
total expenditure / COFOG category	real GDP in national currency election years	lagged dependent population openness the age structure (share of young and elderly in total population) unemployment rate growth rate of total expenditures	Enkelmann and Leibrecht (2013)
expenditure (share of GDP)	ln(population) ln(GDP per capita) openness OECD membership index of ethnic fractionalization fraction of population over 65		Ferreiro, Garcia-Del-Valle and Gomez (2009)
government transfers to households	party linkage	lagged dependent age unemployment total expenditures federalism dummy district magnitude	Lago-Peñas and Lago-Peñas (2009)
education expenditures	corruption index		Mauro (1998)

Source: Authors' literature review.

As the dependent variable, we rely upon category over GDP. When attempting to estimate the 10 COFOG categories, we opted to aggregate them in two main aggregates. Housing and community amenities; Health; Recreation, culture, and religion; and Social protection are aggregated as Social expenditure (SE). Second, Economic affairs and education are aggregated into Productive expenditure (PE)⁸. As for independent variables, they were grouped as main and control variables. Decomposition of equation [3] and a summary of all variables in table 4 are shown below.

$$E_{it} = \alpha_i + \beta \times DETERMINANTS_{it} + \gamma \times CONTROLS_{it} + \varepsilon_{it} \quad (3)$$

E – expenditure aggregation of interest (SE or PE)

DETERMINANTS – group of main variables (ELECTIONS, PARTY_NAT, CORRUPT, GDPEUR)

CONTROLS – group of control variables (OPEN, UNEM, TOTEXP)

⁸ In the preliminary testing phase, we conducted regressions using a variable for public goods and general administration (PGGA), that included the remaining COFOG categories of General public services, Defence, Public order and safety, and Environmental protection. Nevertheless, the determinants and controls showed not to be significant for this spending category that has a steady level over time in all countries. Therefore, we opted not to include it in the final results table.

α – constant coefficient
 β, γ – coefficients of the independent variables
 ε_{it} – error term.

TABLE 4
Variable description and data sources

Variable	Definition	Description	Source
PGGA	Public goods and general administration	Aggregation of General public services, Defence, Public order and safety, and Environmental protection, measured in GDP %	National Financial Institutions, Eurostat
SE	Social expenditure	Aggregation of Housing and community amenities, Health, Recreation, culture and religion and Social protection, measured in GDP %	National Financial Institutions, Eurostat
PE	Productive expenditure	Aggregation of Economic affairs and Education, measured in GDP %	National Financial Institutions, Eurostat
ELECTIONS	Parliamentary elections	Dummy variable taking value of 1 for parliamentary election year, and 0 for other	National Election Commissions
PARTY_NAT	Party nationalization index	The party nationalization index calculated as per Bochsler (2010), where politically decentralized countries are described with a lower index value	National Election Commissions
CORRUPT	Corruption perception index	The corruption perception index, where less corrupt countries are described by a higher index value	Transparency International
GDPEUR	Gross domestic product	Gross domestic product in millions of euros, at current market prices	Eurostat
OPEN	Trade openness	Trade openness index, where higher values are described for more open economies	Eurostat
UNEM	Unemployment rate	Percentage of population aged over 15 years that is unemployed	International Labour Organization
TOTEXP	Total expenditures	Total expenditures, measured in GDP %	National Financial Institutions, Eurostat

There are four main variables in our sample. The elections variable is a dummy to account for the effects of potential additional spending in election years. Second, the party nationalization index is included in the specification to measure the effect of territorial diversity of the party system across territorial units. It is an indicator that shows on party level whether the support for a political party in an

election is equally distributed across the territory of a country. We use the standardized party nationalization score by Bochsler (2010), which is calculated with the use of a template provided by that author. By applying data from each parliamentary election at municipal level⁹, we obtain an index value between 0 and 1 for all our countries. A higher value of the obtained party nationalization index would imply a homogeneous party system with similar results at country and local level. Third, we include the corruption perception index published annually by Transparency International to account for the effects of corruption. The variable takes values between 0 and 10 for each country, where a higher corruption index value implies less corruption in a country. The last determinant variable is GDP, which is obtained from Eurostat and is used to account for the influence of economic success on public expenditures.

As for control variables, there are three commonly used ones. Trade openness is a control variable obtained as the sum of exports and imports divided by the GDP of a country. The amount of trade should make it possible to see how an open economy influences the public spending structure. The unemployment rate aims to capture the effects of the business cycle. Lastly, total expenditures as a percentage of GDP are used as a control variable to check the influence of the level of public spending in each country on its composition. Table 5 provides the summary statistics of all variables.

TABLE 5
Summary statistics

Variable	Mean	Median	Std. dev.	Maximum	Minimum	Observations
PGGA	10.71	9.94	2.97	19.35	6.8	70
PE	10.2	10.06	2.67	21.7	5.3	70
SE	22.94	23.38	3.14	29.1	17.8	70
ELECTIONS	0.27	0	0.45	1	0	70
PARTY_NAT	0.8	0.8	0.11	0.92	0.54	70
CORRUPT	4.55	4.2	0.94	6.7	3.2	70
GDPEUR	26,949.2	34,376.4	16,582.47	54,237.9	3,125.1	70
OPEN	1.07	1.03	0.23	1.61	0.66	70
UNEM	16.59	16.16	7.8	32.18	4.37	70
TOTEXP	43.85	44.91	5.28	60.3	33.1	70

To test for potential multicollinearity, variance inflation factors (VIF) were computed. Only variables with VIF values below 5 were considered acceptable for the final specification. A Breusch-Godfrey test on residuals discarded autocorrelation problems. In order to deal with potential cross-section heteroscedasticity and contemporaneous correlation, both OLS residuals and panel-corrected standard errors

⁹ We use data on parliamentary elections in former Yugoslavian republics from 2005 to 2018. The estimates are made using territory data from lower level units, such as municipalities instead of districts and/or cities. For example, the number of local units in the latest elections up to 2018 for each country was 144 for Bosnia and Herzegovina (2018), 560 for Croatia (2016), 88 for North Macedonia (2016), 24 for Montenegro (2016), 180 for Serbia (2016), and 88 for Slovenia (2018).

were computed and are shown in table 6. Redundancy of both individual and period fixed effects was rejected in all three cases, justifying their presence.¹⁰

TABLE 6
Determinants of COFOG expenditures

	SE	PE
C	12.8484 (2.1)** [1.67]	-32.065 (-3.2)*** [-2.62]**
ELECTIONS	0.498 (2.25)** [2.09]**	-0.3541 (-0.98) [-0.83]
PARTY_NAT	16.8527 (3.49)*** [3.21]***	-4.8893 (-0.62) [-0.56]
CORRUPT	-0.3769 (-1.2) [-1.13]	0.2448 -0.48 [0.46]
GDPEUR	-0.0001 (-1.66) [-1.88]*	0.0001 -0.92 [1.28]
OPEN	-0.8379 (-0.39) [-0.38]	0.1487 -0.04 [0.05]
UNEM	-0.1432 (-3.05)*** [-3.17]***	0.2187 (2.84)*** [2.46]**
TOTEXP	0.0992 (2.09)** [1.94]*	0.8844 (11.39)*** [10.77]***
Observations	70	70
Individual fixed effects	>0.0001	>0.0001
Period fixed effects	>0.0001	0.003
B-G test	0.66	0.16
R-squared	0.97	0.91

*Note: Robust t-statistics computed using panel corrected standard errors (PCSE) are reported in brackets, whereas t-statistics computed using OLS residuals are reported in parenthesis. ***, **, * indicate the statistical significance at 1%, 5% and 10%, respectively. Redundancy F-tests for individual fixed effects and period fixed effects are reported in respective rows. B-G test denotes the Breusch-Godfrey test of AR(1) autocorrelation. Estimates are performed using EViews 9.5.*

The main results are shown in table 6. The election dummy is statistically significant, indicating that it explains the social expenditures. Furthermore, the sign is positive, meaning that social expenditures are increased during electoral cycles. This makes sense since the consequences of such spending are more visible to the voters than the other two aggregates; the governing party can potentially make a good impression

¹⁰ In order to ensure robustness of our results, SUR (Seemingly Unrelated Equations) estimates were also made. The results were similar.

before new elections by increasing the social benefits. Social expenditures are affected by political party nationalization, while productive expenditure is not. Results regarding the corruption index are not statistically significant. A negative relationship between GDP and social expenditures is confirmed at 10% statistical significance. This is expected for two reasons. First, the expenditures are expressed as a percentage of GDP, where an increase of the GDP in levels would mean a decrease in the share of social expenditures. Second, if a country is experiencing economic growth, its expenditures on social causes are expected to decrease. The coefficient of trade openness has the expected positive sign in relation to productive expenditures. Exports and imports are important components of demand which would require more productive spending from a country budget. However, this expected outcome is not confirmed by statistical significance. The unemployment rate is relevant in explaining the movements of both social and productive expenditures. A positive sign in the latter case implies that a higher unemployment rate would require more productive spending. This is in line with our findings in the previous section, where we found that the expenditure policy in all former Yugoslavian countries is countercyclical. Therefore, an expected reaction in a recession when the unemployment is high would be to increase productive spending.

Lastly, it is shown that the social and productive expenditures are positively influenced by the growth of the share of total expenditure in GDP. This finding is interesting insofar as it reveals which aggregates of the COFOG expenditure categories are the ones driving the total expenditures. Furthermore, the findings from the previous section also confirm that most of the COFOG categories belonging to the social and productive expenditure aggregates are influenced by the economic cycle. The changes in GDP are relevant for explaining the changes in total expenditures and their driving components.

5 CONCLUSIONS

The extensive research provided in this paper has covered three aspects of public expenditures in former Yugoslavian countries. First, the convergence analysis confirmed our hypothesis that the public expenditures in these countries between 2011 and 2019 diverge in terms of dynamic, static, and structural aspects. Second, analysis of the sensitivity of public expenditures and the COFOG categories to the economic cycle confirmed that public spending was countercyclical in all former Yugoslavian countries between 2005 and 2019, with Health, Education, and Social Protection expenditures driving the results. Third, the determinants of two main COFOG expenditure aggregates (social expenditure and productive expenditure) were explored. Social expenditures are increased in election years with the expectation of attracting voters to the policymakers awarding them. Furthermore, more social expenditures are expected to be made in less diverse party systems. Nevertheless, social spending is expected to decrease its share in expenditures in a booming economy, which is characterised by a growing GDP and shrinking unemployment. Lastly, productive expenditures are increased when unemployment is high, in order to combat recessions, which confirms our countercyclicality findings.

Finally, this extensive research has opened the door to multiple interesting conclusions for policymakers and further research. Making the COFOG data for the Western Balkan subgroup of former Yugoslavian countries available in common databases would be the main step in that direction. The intriguing results on countercyclicality in the period where the neighbouring EU countries were mainly following a pro-cyclical fiscal policy would be interesting to check. Whereas this may not be a typical finding for developing countries, the social, health and education expenditures explain how acting as automatic stabilisers they drive the expenditures against the economic cycle. Furthermore, in recession times it is a much more difficult (and unpopular) task to implement austerity measures for policymakers (especially in electoral cycles), complementing the said conclusion. Social expenditures seem to reflect changes in various aspects of a country's economy, having a major impact on overall expenditures. Insofar as the determinants are concerned, the political party data on elections is currently the best proxy for government decentralization in some countries. Could it be that the legacies of the former Yugoslav centralized and socialist model are still present to this day? Are the interactions they are having with the European integration process the ones that determine the economic development of these countries? There are several conclusions pointing in this direction: the non-clustering with new EU member states; weak convergence of public expenditures among the ex-Yu, predominant influence of social expenditures; strong political aspect in explaining the increase in expenditures; and less diverse parliamentary systems (more authoritarian?) being the ones that can cope with increased spending. Now that certain expenditure categories have been identified as the main tools in the hands of policymakers, a more detailed analysis will be necessary in the future. Putting more emphasis on the effects of public spending would help achieve the required discipline and discover how resource allocation can be optimized.

Disclosure statement

The authors declare that there is no conflict of interest.

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