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TECHNICAL EFFICIENCY IN THE BALKANS- DO COMPETITIVENESS, GOVERNANCE AND ECONOMIC FREEDOM MATTER?

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Abstract

The main focus of this study is assessing technical efficiency in the Balkan region and its relationships with national competitiveness, governance, and economic freedom. We used longitudinal data, as well as cross-sectional data. The basic variables we used are GDP, country land area, Gross Fixed Capital Formation, employed workforce, competitiveness index, economic freedom index, and estimates for governance or its specific components/determinants. The methods we used are the Stochastic Frontier Approach, Average Productivity Rank, and regression modeling. The study reveals that the average technical efficiency in the region is quite low, 46%, with huge opportunities for improvement, up to 82% for specific countries. It also reveals that competitiveness, governance, and its specific indicators such as rule of law, government effectiveness, corruption, and regulatory quality have a significant effect on technical efficiency. The same factors affect also competitiveness; the latter is also impacted by economic freedom. Finally, some political implications are developed.

Keywords: competitiveness, corruption, economic freedom, efficiency, governance, regression model, rule of law, stochastic frontier analysis

INTRODUCTION

An efficient and competitive economy is the result of the interaction of many economic, institutional, technological, political, socio-demographic, natural, and climate-related character factors. Among these factors, those concerning the quality or the effectiveness of public governance, regulatory quality, rule of law, and economic freedom characterizing a country could have a huge effect on both efficiency, and competitiveness.

As the data indicate, the variance between countries regarding the levels of some of these factors is huge. Thus, as evidenced by The Global Economy (2020), in the year 2018 the effectiveness of governance ranged from 2.23 (for Singapore) to 0.11 for Albania, and -2.24 for Yemen. The indicator for the rule of law in the year 2018 ranged from 2.05 (for Finland) to -0.39 for Albania and -2.33 for Somalia, while the maximum possible level is 2.5 and the minimum is -2.5. Even regarding the degree of competitiveness, a large variation exists: for 2018 it varied from 85.6% (the USA) to 58.1% (Albania) and 35.5% (Chad).

The data evidence not only the possibility, but also the need of improving these basic indicators, with a presumable impact on increasing the productivity, efficiency, and competitiveness of a country, or specific regions.

However, thus far, no assessment of the technical efficiency has been conducted for countries pertaining to the Balkan region as a whole. Besides this, no assessment of the role of public governance, regulatory quality, rule of law, and economic freedom on technical efficiency or competitiveness in this area has been carried out.

We aim at filling this knowledge gap, so the purpose of our research is to assess of the level of technical efficiency and the role of governance, regulatory quality, rule of law, and economic freedom on the level of both technical efficiency and competitiveness in the Balkan region.

Achievement of this objective would contribute to increased awareness and promoting mutual learning between Balkan countries, as well as encouraging joint efforts (measures, policies) for substantial improvements in terms of national efficiency and competitiveness, which in the final analysis would lead to the improvement of people's standards of living.

CONCEPTUAL FRAMEWORK AND REVIEW OF LITERATURE

At the beginning of this investigation in order to facilitate further reading, we want to acquaint the reader with some useful definitions, which have been used throughout the text.

Gross Domestic Product (GDP) according to OECD (2020) is the standard measure of the value that has been added through the production process of goods and services in a country during a certain period. Gross fixed capital formation (GFCF), also called "investment",

according to OECD (2020) is defined as the acquisition of produced assets (including purchases of second-hand assets), including the production of such assets by producers for their own use, minus disposals. The workforce or the employed, according to OECD (2020) comprises all persons above a specified age who during a specified brief period, either one week or one day, that fall in either of the following categories: (a) paid employment; (b) self-employment.

As far as competitiveness is concerned, there is not a unique definition. According to World Economic Forum (WEF), which has been measuring it since 1979, competitiveness is the set of the attributes and qualities of an economy that allow for more efficient use of factors of production (WEF, 2019). WEF has defined competitiveness also as the set of institutions, policies, and factors that determine the level of productivity of a country (WEF, 2016). Besides, according to the European Commission, a competitive economy is one that has a consistently high rate of productivity growth (EU, 2014).

Some authors define competitiveness as the ability of a nation to provide a conducive environment for its firms and industries to prosper (Bhawsar and Chattopadhyay, 2015).

The competitiveness of a country is measured by the World Economic Forum (WEF) through an indicator called the Global Competitiveness Index (GCI), which is based on 12 pillars (see Figure 1 in the Annex). These pillars are organized in four dimensions as Figure 1 in the annex shows. GCI indicates the role of drivers of TPF (Total Factor Productivity); it serves as a measure of the effect of factors that cannot be explained by labor, capital, and other inputs (WEF, 2019).

Good Governance, or in short Governance, is another key concept we made use of**.** Though there is not a unique definition of this concept, we refer here to a simple definition made by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), according to which good governance is the process of decision-making, the process by which decisions are implemented, or not implemented (UNESCAP, 2009). Just to emphasize at the very beginning how important governance is, we bring here the statement of another important institution, USCIB, whereby good governance and the rule of law at the national and international levels are essential for sustained, inclusive, and equitable economic growth, sustainable development and the eradication of poverty and hunger (USCIB, 2015). Governance is measured by a composite index based on 10 indicators, as Figure 2 in the annex shows.

According to the Global Economy (2020), the rule of law is the extent to which agents in a country have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. United Nations (UN) defines the rule of law as a principle of governance in

which all persons, institutions, and entities, public and private, including the state, are accountable to laws that are publicly promulgated, equally enforced, and independently adjudicated, and which are consistent with international human rights norms and standards.

According to OECD (2019), the rule of law is a basic value and a foundation of good governance. Investment in the rule of law, including access to justice and legal enforcement, can help tackle corruption and injustice, close the gap between formal and actual rights, and trigger legal and institutional change.

Government effectiveness is probably the most important composite of Governance. Essentially, it is the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (The Global Economy, 2020).

Regulatory quality can be understood as the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development (The Global Economy, 2020).

Corruption is meant as the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as the "capture" of the state by elites and private interests (USCIB, 2015). Corruption is a symptom of institutional weakness that reduces economic growth (Mauro, 1995).

Economic freedom (EF) is a key concept for a democratic system of governance. Generally, it has to do with personal choice, voluntary exchange coordinated by markets, freedom to enter and compete in markets, and protection of persons and their property. Economic freedom is a complex concept that encompasses 9 specific elements (The Global Economy, 2020), as Figure 3 in the annex shows.

Technical efficiency (TE) is the ability of a firm, or a country in our case, to obtain the maximum output with the given amount and combination of inputs, or to produce a given amount of output with minimum inputs. It differs from allocative efficiency, which is the ability of the firm to produce at minimum cost or to use inputs in optimal proportions for given prices and technology (Osmani et al., 2017). By hypothesis, a country's TE is dependent on its governance (rule of law, governance effectiveness, regulatory quality, and control of corruption), its competitiveness, and economic freedom levels, though interdependences between these factors may exist, too.

The literature on the relationships between competitiveness, governance (or its components), and economic freedom of a country is vast, but it seems to be limited, or we were not able to find much evidence for relationships between technical efficiency and these

variables, at the level of countries or large geographical regions. In this regard, we view our research as a specific and innovative contribution.

Evidence on the role of government effectiveness on growth is vast, too. It fully supports the positive role of competitiveness in terms of economic growth. According to Bedane et. al., (2017), who analyzed a panel of 81 countries with the method of System Generalized Method of Moments, there is a positive effect of government effectiveness on economic growth. But economic growth can be hindered if public institutions are weak and the government is ineffective (Nguyen, 2009).

Extensive research has been conducted to explore factors that affect competitiveness. At the forefront are researchers investigating direct factors of competitiveness, such as micro environment, investment, worker skills, or the quality of technologies and inputs at the microeconomic level. In the other trench are the researchers who try to link the level of competitiveness with social infrastructure, institutional factors, market functionality, political factors, as well as social and economic factors at the macro level.

Important institutions, such as EBRD, underline that in specific countries of the Balkan region there exist major weaknesses such as weak rule of law, weak law enforcement, low competitiveness, unclear property rights, low productivity, corruption, and informality as major weaknesses. Weak rule of law and capacity in the judiciary system, in particular, can significantly limit private sector development. In the case of Albania, weak law enforcement and unclear property rights affect, among others, the tourism and agribusiness sectors, which actually are meant as key drivers of the economic growth of the country. In addition, private sector development suffers from widespread informality which creates unfair competition (EBRD, 2020).

Other research shows that decisive factors of competitiveness are labor productivity, (Rusu and Roman, 2018) economic freedom (Verner, 2015), social infrastructure, political institutions, monetary and fiscal policy, and microeconomic environment (Delgado et al., (2012). Brunet (2012) considers economic freedom as a catalyst for productivity and efficient allocation of resources and as a factor that explains most of the differences between countries and provides a way for nations to compete and improve their competitiveness. Bujancă and Ulmana (2015) analyzed data from the Global Competitiveness Report and Economic Freedom worldwide and they as well found a positive relationship between competitiveness and economic freedom.

Research brings clear evidence of the role of institutions, rule of law, and regulation quality as drivers of competitiveness (Mia, 2009), and the functioning of markets (SAERG, 2018). OECD argues that regulation can affect competitiveness if it constrains the number of

firms in the market or reduces firms' ability or incentives to compete, or limits the ability of consumers to make good buying decisions. Besides, regulation can affect competition negatively by altering firms' incentives to act as rivals (OECD, 2016). Low competitiveness could be related to ineffective regulation and informality, lack of entrepreneurial and technological know-how, as well as low education levels. Besides, insufficient capacities of public administration seem to be a reason for the ineffective regulation and the informal economy.

Several researchers, even institutions like those of the EU, look at the micro reasons for the high competitiveness of EU countries, such as the highly skilled workforce, high quality of products, and efficient public administration (EU, 2014). Nguyen (2009) highlights again that shortage of production resources, weak public institutions, and ineffective governance are major reasons why competitiveness is low.

In relation to productivity and efficiency, Parker and Kirkpatrick (2012) investigated the role of regulation on economic efficiency and found that good regulation helps to correct market failures, thereby stimulating growth and economic efficiency. But ill-designed regulation can cause a certain amount of regulatory burden; therefore it can bring about some amount of efficiency reduction.

Research has shown a positive relationship between economic freedom and productivity (Bujancă and Ulmana, 2015). But productivity (and efficiency) could be lower if the country is short of production resources; if it is dominated by inefficient state-owned enterprises if public institutions are weak, and if governance is ineffective (Nguyen, 2009).

An improvement in the rule of law represents a good strategy in the fight against corruption (De Mendonca and Da Fonseca, 2012). And lower corruption means higher efficiency.

Not only does productivity enhance the competition, but vice-versa is also true; competition can drive greater productivity, and thus a positive relationship exists between competition and productivity. Experience shows that countries can achieve higher levels of productivity growth with lower levels of product market regulation because in this way they stimulate stronger competition. As the literature recommends, a regulation that supports innovation and disruption would be a good recommendation to achieve higher levels of productivity and competition (CMA, 2020).

Discussing the situation of competitiveness in the Western Balkans, Sanfey et al. (2016) argue that long-term productivity could be hindered by the lack of appropriate factors and institutions. Among these factors with negative effects on productivity, the authors mention failure to use talent, lack of business sophistication, and low quality of transport infrastructure.

Moreover, for a country to be competitive not only needs institutions, but it must have an appropriate combination of institutions and policies, such as effective governance, business environment, and production factors that can trigger increased productivity in the long run. Actually, foreign direct investment is qualified as a vital requirement for higher levels of competitiveness in the region.

According to EBRD, the reasons why productivity is low are skills shortages and mismatches, lack of know-how and business sophistication, low investment in R&D, and weak innovation capacity in the economy. Corruption and informality remain still key hindrances to business development and foreign investment (EBRD, 2020).

Research Hypotheses

Based on this literature review, research purpose, and the problem we have sketched out these research hypotheses:

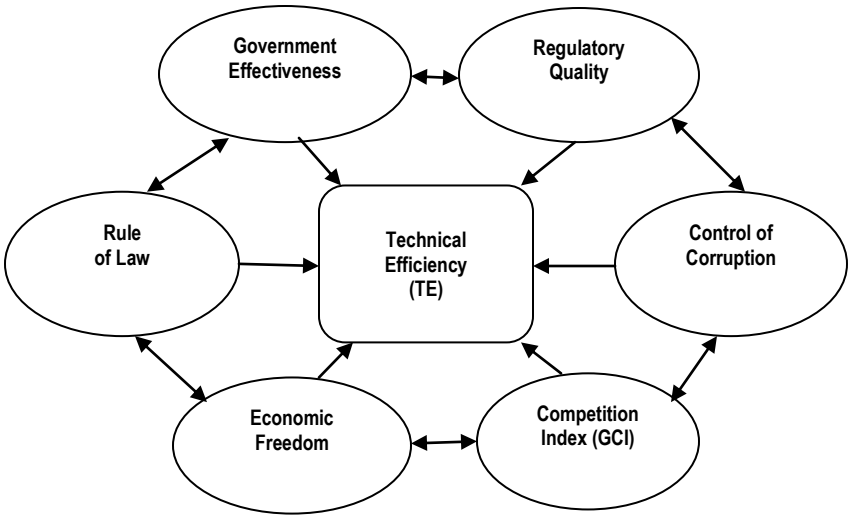
Hypothesis 1: Regional aggregate (average) technical efficiency is relatively low.

Hypothesis 2: There are large differences in technical efficiency between the Balkan countries.

Hypothesis 3: The efficiency of a country is positively influenced by its competitiveness level, government effectiveness, regulatory quality, degree of corruption control, rule of law, and economic freedom.

Hypothesis 4: Competitiveness is positively influenced by the government's effectiveness, regulatory quality, degree of corruption control, economic freedom, and rule of law of the country.

Figure 1: Hypothesized dependence and interrelationships between TE and its factors



METHODOLOGY

We have used cross-section and panel data for all Balkan countries, with the exception of Kosovo for which there is no complete data, for the years 2008-2018. The panel data (for GDP, GFCF, LAND, TOTEM) are used to evaluate technical efficiency, while cross-section data (GCI, TE, GOEF, RULAW, REQUA, EFI) are used to evaluate the effects of variables with interest in the degree of competitiveness and efficiency. In fact, GFCF and LAND are used as substitutes for Capital Stock and Natural Resources, respectively, since data about these variables are missing. The variables we have used are shown in Table 1.

Table 1. Research Variables

Nr.	Variables	Label	Measurement Scale	Measurement Unit
1	Government effectiveness	GOEF	Ratio	-2.5 (weak) to 2.5 (strong)
2	Gross domestic Product	GDP	Ratio	Millions US$ in 2015 prices
3	Country Area	LAND	Ratio	Thousands of Hectares
4	Gross Fixed capital Formation	GFCF		Millions US$ in 2015 prices
5	Total employment	TOTEM	Ratio	Thousands
6	Regulatory quality	REQUA	Ratio	-2.5 (weak) to 2.5 (strong)
7	Rule of Law	RULAW	Ratio	-2.5 (weak) to 2.5 (strong)
8	Index of Economic Freedom	IEF	Ratio	0 to 100
9	Global Competitiveness Index	GCI	Ratio	0 to 100
10	Technical Efficiency	TE	Ratio	0 to 1
11	Technical Efficiency	TEO	Ordinal	Low, Medium, High

The data source is the FAOSTAT database (http://www.fao.org/home/en), the World Economic Forum Global Competitiveness Index (http://reports.weforum.org/global-competitiveness-index/, and The Global Economy data (https://www.theglobaleconomy.com/download-data.php). Why did we choose the 2008-2018 period as the study period? For some years and countries, the latest data provided by the used data sources pertain to the year 2018 (This is the case of GDP for Albania, North Macedonia, Romania, etc.), so 2108 as the last year of the study period is obligatory. The latest data for some other variables pertaining to the year 2019 (GFCF for Romania and Montenegro, Competitiveness Index for Albania, Moldova, Serbia, etc.)

We have used data for the period 2008-2018. We could use fewer years, but the reason for taking 11 years is of a purely methodological nature; more years, that is more data, means more efficient econometric models. In simpler words, because of possible external or internal

shocks of different natures in different years and countries, the effect of factors on the level of productivity and efficiency could be biased. To possibly avoid, or reduce this bias we should use more data.

In terms of method used, first we propose and make use of a method that we want to call the Average Productivity Rank (APR). Then we use the the classical regression model to evaluate the relationships between the variables and to test the hypotheses, and Stochastic Frontier Approach (SFA) method to evaluate the technical efficiency for each country.

The Average Productivity Rank

To use this method we first chose some important productivity measures, as GDP per unit of land, GDP per worker, and GDP per unit of GFCF. We determine the country rank for each of the productivity measures and then we calculate the average rank for each of them, otherwise the joint productivity rank. In the end, we order the countries by their joint rank and use this measure as their approximate position of technical efficiency. The rationale behind this approach is that between productivity and technical efficiency there is a positive relationship.

The Classical Regression Model

If Y is a dependent variable, X is a vector with independent or explanatory variables, and **n** is the number of cross-sections the classical regression model will have the form:

$\mathbf{Y_i=B_0+B_iX+e_i}$, for i=1, 2, 3, n

In our research Y is Technical Efficiency (TE), Global Competitiveness Index (GCI), or Government Effectiveness (GOEF), as appropriate. $\mathbf{B_0}$ is the free parameter of the model (expected value of Y when all factors X are equal to zero) while $\mathbf{B_i}$ are the regression coefficients that show the change of Y (increase or decrease, depending on the coefficient sign) if the factor $\mathbf{X_i}$ increases by one unit while other factors are kept constant. The term $\mathbf{e_i}$ is the individual-specific random error term, indicating the effect of other factors on Y. The random term is assumed to have a normal distribution and is homoscedastic. Model testing can generally be performed with the Fisher F-test, while coefficients are tested with the Student's **t**-test.

Stochastic Frontier Approach (SFA) model

SFA was elaborated by Aigner, Lovell, and Schmidt (1977) as well as Meeusen and van den Broeck (1977). To measure efficiency/inefficiency we can use the Cobb-Douglass model

with logarithmic variables since the output function is thought to have a concave nonlinear shape. In the case of panel data with T time periods for **n** individuals (countries) this model has the following form:

$$\mathbf{Y_{it} = B_0 + X_{it}B + v_{it} - u_{it}}$$

Where, Y is the dependent variable, X is the factors or inputs considered in the model, B is a vector with (K) parameters, where K is the number of factors or inputs.

In the SFA model, unlike the classical model where the residues (errors) are considered only random effects, the residues are divided into two components: random effects (v_i) and inefficiency (u_i). Thus, (for the model with panel data) $\mathbf{e_{it}=v_i-u_{it}}$. One assumption of the model with panel data is that $u_{it}=u_i$. The term $\mathbf{u_i}$ is the (non-negative) term of technical inefficiency and is assumed to have a semi-normal positive distribution with mean **μ** and constant dispersion σ_u^2**.** The term $\mathbf{v_i}$ indicates the country-specific random effects and is assumed to have a normal distribution with a mean of 0 and constant dispersion σ_v^2. Both $\mathbf{u_i}$ and the $\mathbf{v_i}$ are assumed to be independent of each other and of the regressors (explanatory variables) of the model. Important estimates related to the SFA model are the following:

$$\mathbf{S = \sqrt{S^2} = \sqrt{S_v^2 + S_u^2}}, \quad \mathbf{\delta = \frac{S_u}{S_v}}, \quad \mathbf{\gamma = \frac{S_u^2}{S^2}}$$

$\mathbf{S^2}$ is the sum-dispersion of the two error term components. **δ** is the ratio of the standard deviation of the term inefficiency, **γ** is the part (**γ** <= 1) that occupies the dispersion of the inefficiency component in the sum of dispersions.

To obtain the efficiency scores for each individual, the term technical inefficiency $\mathbf{u_i}$ is first calculated for each individual:

$$\mathbf{\hat{u}_i = \frac{S\delta}{1+\delta^2}\left[\frac{(w_i)}{1-\varphi(w_i)} - w_i\right]}, \text{ where } \mathbf{w_i = \frac{e_i\delta}{S}}$$

After evaluating the technical inefficiency term, then technical efficiency (TE) is calculated for each individual of the panel:

$$\mathbf{TE_i = Exp(-\hat{u}_i)}$$

Where $\mathbf{Y_i}$ is the observed for each country values of the variable Y, $\mathbf{Exp(X_iB)}$ are the potential values of the dependent variable, $\overline{\mathbf{Y}}$ are also the potential values of the variable Y.

An important step of SFA analysis is to test the hypothesis on the existence of technical inefficiency. This can be done with two methods:

First method: Using the One-Side LR test:

$$\mathbf{H_0 : \sigma_u^2 = 0 \ against \ H_1 : \sigma_u^2 > 0}$$

If H_0 is not accepted we have technical inefficiency in the model.

Second method: Generalized LR Test:

$$\mathbf{H_0 : \gamma = 0 \ against \ H_1 : \gamma > 0}$$

Likelihood Ratio (LR) statistic is calculated as follows:

$$\mathbf{LR = -2\left(Ln(LR_0) - Ln(LR_1)\right)}$$

where LR_0 is the value of LR when is true H_0 (there is no inefficiency in the model) and LR_1 is the value of the LR test when true is H_1 (there is inefficiency in the model). To evaluate the econometric modeling we used STATA software. For more information about the classical regression model see (Gujarati, 2004; Wooldridge, 2013; Osmani, 2017). For more information on SFA refer to (Kumbhakar et al, 2015; Baltagi, 2005; Ilardi and Atella, 2013; Osmani et al., 2017; Osmani and Kambo, 2019).

RESULTS

To create an initial idea about the level of efficiency in the region we first used the method of Average Productivity Rank. In the following table, we present the productivity of labor, land, and capital (capital investments) by countries. Once we find the rank of each country for each indicator separately, assuming the same weight for each indicator, we calculate the average rank and finally the position of each country based on the joint (average) rank.

Table 2. Productivity, and productivity-based rank by country
(averages for the period 2008-2018)

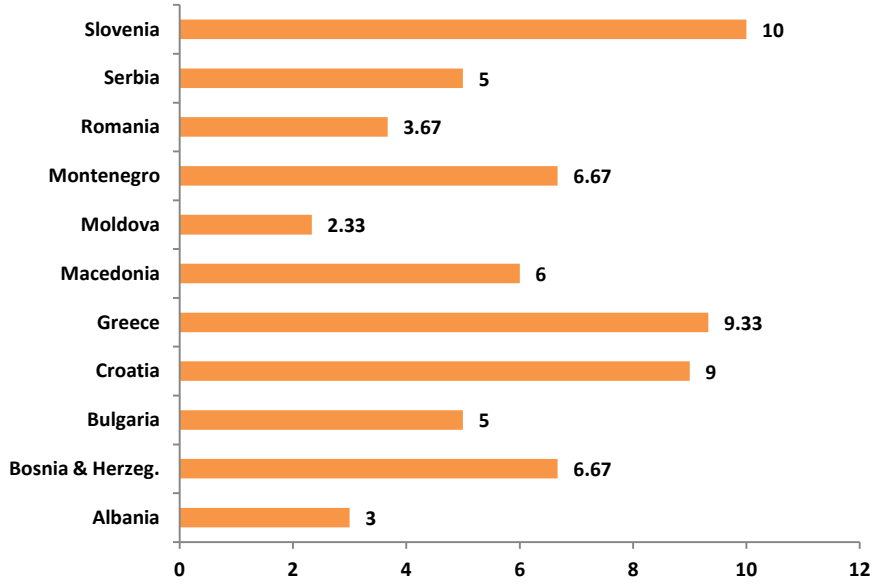
Country	Productivity measures			Rank based on each measure			AVERAGE RANK	POSITION
	GDP/ GFCF	GDP/ LAND	GDP/ TOTEM	GDP/GFCF RANK	GDP/LAND RANK	GDP/TOTEM RANK		
Albania	3.75	1.31	2.64	1	6	2	3	2
Bosnia & Herzeg.	5.45	0.86	3.53	9	5	6	6.67	7
Bulgaria	4.58	0.62	3.51	6	4	5	5	5
Croatia	4.82	1.55	6.46	10	8	9	9	9

Greece	6.62	1.44	8.28	11	7	10	9.33	10
North Mac.	4.55	1.79	3.01	5	9	4	6	6
Moldova	4.19	0.53	1.46	4	2	1	2.33	1
Montenegro	4.11	4.59	4.49	3	10	7	6.67	8
Romania	3.98	0.36	4.99	2	1	8	3.67	3
Serbia	5.45	0.61	2.77	9	3	3	5	4
Slovenia	4.82	10.32	9.56	8	11	11	10	11

Source: http://www.fao.org/home/en; authors' calculations.

The following graph shows clearly the approximate position of each country in relation to the productivity of the basic factors of production, labor, land, and capital investment, which can be taken as an approximate indication of the levels of technical efficiency of each country.

Graph 1: Productivity of basic factors (GDP / Labor, GDP / Land, GDP / GFCF) by country



Source: http://www.fao.org/home/en; authors' calculations.

As it can be seen, Slovenia, Greece, and Croatia are countries with the highest productivity of these factors, and they may also be the best in terms of technical efficiency. The lowest productivity levels are found in Albania and Moldova. For Albania, these levels are more than three times lower than in Slovenia, more than twice lower than in Macedonia, etc.

Further, based on a panel of data for 11 years (2008-2018) and 11 countries, we evaluated the technical efficiency of each country in the region based on the SFA method. The model we use is:

$$\ln(GDP/LAND)_{it} = B_0 + B_1 Ln(GDP/GFC)_{it} + B_2 \ln(GDP/TOTEM)_{it} + B_3 Time + v_{it} - u_{it}$$

For i=1, 2, 3…, 11, t=1, 2, 3, 11

The estimated model with STATA is as in Table 3:

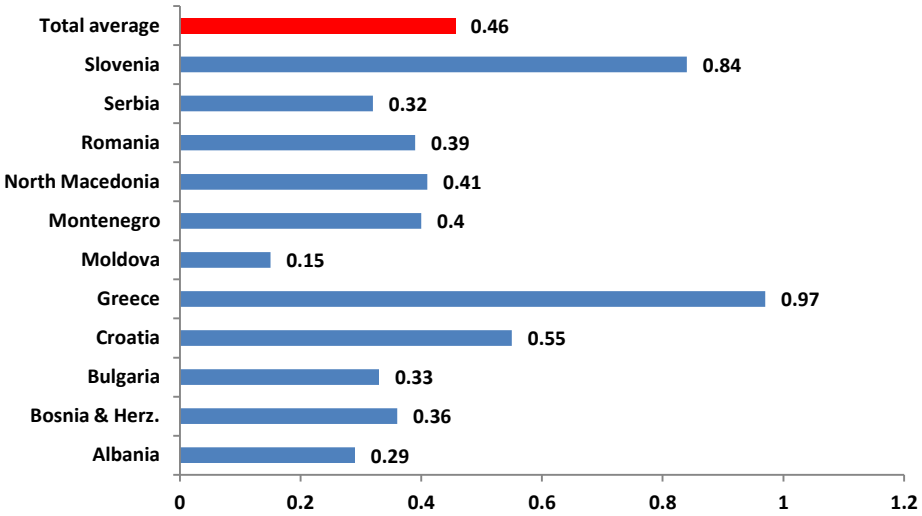
Table 3. The inefficiency model

	Coef.	Std.Err.	Z	P>|z|
l_gdpland	.1736774	.0327127	5.31	0.000
L_totempland	.6906142	.068004	10.16	0.000
t	.0151536	.0014339	10.57	0.000
cons	3.420611	.1148712	29.78	0.000
/mu	.9090772	.2387192	3.81	0.000
/lnsigma2	-1.049043	.603226	-1.74	0.082
/ilgtgamma	5.153273	.623667	8.26	0.000
Sigma2	.3502727	.2112958		
Gamma	.9942528	.0035838		
Sigma_u2	.3482596	.2112958		
Sigma_v2	.0020131	.0002807		

Note: Log likelihood=152.678, Wald $Chi^2(3)=498.95$, Prob>$Chi^2=0.0000$

Using STATA, we obtained the estimates of technical inefficiency scores for each country. The following graph shows the mean technical efficiency scores during the period 2008-2018 for each country. The mean efficiency score for the entire region is 0.46. This means that with actual Land, Labor, investment, and the actual level of technology in the region it can be achieved a 56% higher productivity, or since the country areas (land) are fixed, 56 % more production. The countries with the highest technical efficiency are Greece, Slovenia, and Croatia, while Albania and Moldova are again the countries with the lowest technical efficiency, meaning that these countries make less efficient use of their basic resources.

Graph 2: Mean technical efficiency by country



Source: Authors' estimations

In addition, we found a high and significant correlation between technical efficiency scores (TE) and the average productivity rank (APR), with a correlation coefficient of 0.9 meaning that both methods yield almost the same results for the positioning of countries in terms of technical efficiency. This could be considered as an indication of the consistency of results on technical efficiency obtained with the previous method.

Further on, we tried to assess the effect of the hypothesized factors on the level of technical efficiency, the level of competitiveness, and the effectiveness of governance in each country in the region.

In the following table, we show the clustering of the countries into three efficiency groups according to the level of technical efficiency (TEO): Low, Medium, and High. One can easily note that clusters of countries with higher technical efficiency have higher competitiveness, more effective governance, better rule of law, and regulatory quality but do not appear to have substantial differences in economic freedom. These findings indicate the determining factors of technical efficiency and competitiveness.

Table 4. Data on basic variables of the Balkan region by country

	TE	GCI	GOEF	REQUA	RULAW	IEF	TEO
Moldova	0.15	55.50	-0.47	-0.05	-0.41	56.00	**Low**
Albania	0.29	58.10	0.11	0.26	-0.39	67.00	
Serbia	0.32	60.90	0.11	0.01	0.15	66.00	
Bulgaria	0.33	63.60	0.27	0.58	-0.03	70.00	

Average of Low TE countries	***0.27***	***59.53***	***0.01***	***0.20***	***-0.17***	***64.75***	
Bosnia & Herz.	0.36	54.20	-0.62	-0.21	-0.23	63.00	**Medium**
Romania	0.39	63.50	-0.25	0.45	0.33	70.00	
Montenegro	0.40	59.60	0.13	0.36	0.10	62.00	
North Macedonia	0.41	56.60	0.09	0.52	-0.28	70.00	
Average of Medium TE countries	***0.39***	***58.48***	***-0.16***	***0.28***	***-0.02***	***66.25***	
Croatia	0.55	60.10	0.46	0.45	0.32	62.00	**High**
Slovenia	0.84	69.60	1.13	0.69	1.06	68.00	
Greece	0.97	62.10	0.34	0.30	0.15	60.00	
Average of High TE countries	***0.78***	***63.93***	***0.64***	***0.48***	***0.51***	***63.33***	
Simple average	***0.46***	***60.34***	***0.12***	***0.31***	***0.07***	***64.91***	

Source: WEF Global Competitiveness Index 2019;

The Global Economy, 2019; authors' calculations.

Note: Classification of countries in categories Low, Medium, or High Efficiency is done by the authors based on the value of the TE scores.

The relationship between the efficiency, competitiveness, and effectiveness of the government and their potential factors, is more clearly shown in Table 5, where we present the correlation coefficients between each pair of indicators/variables.

Table 5. Correlation coefficients between variables

TE	**GCI**	**GOEF**	**REQUA**	**CORRCONT**	**RULAW**	**IEF**	
1.0000	**0.5991**	**0.6839**	**0.4425**	**0.7199**	**0.6741**	-0.0236	**TE**
	1.0000	**0.7986**	**0.7187**	**0.8619**	**0.8815**	0.4292	**GCI**
		1.0000	**0.7586**	**0.8733**	**0.7549**	0.2898	**GOVEF**
			1.0000	0.7378	0.5664	0.5782	**REQUA**
				1.0000	0.9401	0.2709	**CORRCONT**
					1.0000	0.2468	**RULAW**
						1.0000	**IEF**

The estimated econometric models indicate significant relationships. These models are shown in Table 6.

Table 6. The estimated econometric models

Model	Dependent variable	Explanatory variables	Coefficients	p-value	Significance	R^2	P-value(F)
1	GCI	const	58.5952	<0.0001	***	0.9830	8.36e-08
		RULAW	7.1793	0.0002	***		
		REQUA	4.9014	0.0719	*		
2	TE	const	-1.5669	0.0441	**	0.4995	0.015035
		GCI	0.0336	0.0150	**		
3	TE	const	0.4180	0.0001	***	0.7261	0.000867
		GOEF	0.3698	0.0009	***		
4	TE	const	0.3136	0.0010	***	0.9776	2.50e-07
		RULAW	0.2895	0.0013	***		
		REQUA	0.3138	0.1000	*		
5	TE	const	0.5044	<0.0001	***	0.8131	0.000148
		CORRCONT	0.4009	0.0001	***		
6	GOEF	const	-0.2482	0.0560	*	0.8222	0.001000
		REQUA	0.9093	0.0016	***		
		RULAW	0.4184	0.0552	*		
7	IEF	const	63.037	0.0000	***	0.412	0.033262
		REQUA	8.077	0.0333	**		
8	IEF	const	40.989	0.0086	***	0.315	0.072300
		GCI	0.3939	0.0723	*		

Source: Authors' calculations

As one can easily read from the table, the degree of competitiveness depends positively and significantly on the rule of law and regulatory quality; technical efficiency depends positively and significantly on competitiveness, rule of law, regulatory quality, and degree of corruption control in the countries of the region. In other words, the better the rule of law and the better the regulatory quality, the higher will be the degree of competitiveness of a country, and the higher will be its technical efficiency. But, since the effectiveness of governance is determined by the rule of law and regulatory quality, then the effectiveness of governance seems to be a key factor in increasing both the level of competitiveness and technical efficiency of a country. If we want to differentiate between factors in terms of the degree of impact, then the rule of law is a key to higher competitiveness, government effectiveness, and technical efficiency.

DISCUSSION

This study aims at assessing the technical efficiency in the Balkan region, as well as at identifying some basic factors that affect them. Besides, the study contributes to having a clear understanding of the relationship between technical efficiency on one side, and national competitiveness and good governance on the other one. The results build on the existing evidence of country-level variables such as GDP, GFCF, Land area, GDP, competitiveness index, governance indicators, economic freedom, and other secondary data.

The results indicate that the level of technical efficiency in the Balkans is substantially low (0.46 or 46%) with mammoth variances between countries (0.82 or 82% between Greece and Moldova) which means that there is huge potential for productivity and output increase in the region.

In line with the hypothesis, there is a positive relationship between the level of technical efficiency and the degree of national competitiveness, government effectiveness, rule of law, regulatory quality, and the degree of corruption control, all contributing significantly to the level of technical efficiency. This means that good governance is a precondition not only for a higher level of competitiveness but also for higher technical efficiency. These results are also in line with findings from literature as far competitiveness is concerned and they are a novelty as far as technical efficiency is concerned since no findings from the literature have been possible thus far.

Although the improvement of technical efficiency is not directly related to these factors, these results show that substantial changes in governance and national competitiveness along its 12 pillars could bring about substantial improvement in technical efficiency, too. A major point of interest here is, as the literature highlights, that competitiveness and efficiency could not improve if regulation is poor or burdensome (Parker and Kirkpatrick, 2012), or when a country's civil administration or institutions are ineffective (EU, 2014; Sanfey et al., 2016), or when courts fail to deliver justice, or when markets are not functioning efficiently.

The study demonstrates a relatively strong correlation between government effectiveness, technical efficiency, and competitiveness on one side, and rule of law and regulatory quality, on the other one. This shows that these three indicators are extremely important for the rule of law and regulatory quality. We want to argue that any adjustment or improvement of efficiency and competitiveness should start from here; specific little improvement within the system by leaving unchanged the rule of law and the regulatory quality could be largely ineffective.

Based on the results, part of hypothesis (iii) is not supported, since technical efficiency is not directly and significantly correlated with the degree of economic freedom. However, since

both technical efficiency and economic freedom have common roots (both are significantly correlated with competitiveness and regulatory quality), the degree of economic freedom may indirectly (through competitiveness and rule of law improvement) impact technical efficiency. We want to argue that the direct effect of economic freedom is not verified because of few degrees of freedom (the corresponding model has been estimated using only 11 data points).

The variance of country endowments in resources may have an impact on productivity and efficiency. However, this factor has not been within the scope of our research.

In conclusion, we want to argue that our study makes a contribution to filling the knowledge gap about the level of technical efficiency and some of its factors in the Balkan region. He also provides empirical support for relationships between determinants of competitiveness, governance, and economic freedom in this specific region.

CONCLUSIONS

This study aims at addressing the issue of technical efficiency and competitiveness in the Balkan region together with exploring some of the major determinants of good governance.

Improving the quality of governance could have a huge impact on the level of resource efficiency and national competitiveness in Balkan countries. Improving efficiency and competitiveness is imperative to the economic growth of countries and improving people's standard of life. Good governance has to play an important role in this regard.

Longitudinal secondary data for 11 Balkan countries and 11 years (2008-2018) have been administered to assess the level of technical efficiency, and data for the year 2018 were used to investigate major determinants of technical efficiency and competitiveness in this area.

Stochastic Frontier Analysis (SFA) and Average Productivity Rank (APR) methods were employed to assess the level of technical efficiency, while the classical regression model was applied to identify some of their major determinants.

The major results this research yielded have to deal with the level and variations in technical efficiency among countries in the region, as well as some determinants of technical efficiency and competitiveness. The average technical efficiency was 46%, with a variation width of 82% between the highest (Greece) and the lowest (Moldova). In the region there are great opportunities (on average up to 54% more) to increase technical efficiency, thus ensuring a significant increase in productivity and production. In certain countries, the opportunities for growth are even greater.

The average level of competitiveness in the region is around 60%, with not much variation between countries, but with huge opportunities for growth at the regional level (up to 40% more).

The main determinants of technical efficiency at the national level are rule of law, regulatory quality, effective governance, control of corruption, and competitiveness. The main determinants of regional competitiveness are rule of law and regulatory quality, otherwise good governance, and economic freedom.

POLICY IMPLICATIONS

We hope the results of this study will serve as an indication to initiate and stabilize platforms of mutual learning and boost acting together between the countries of the region, in order to identify key points needing improvement for their own interests.

The Balkan countries have the opportunity to increase the technical efficiency of using THEIR basic resources. These can be achieved by continuously, professionally, and effectively addressing all elements of good governance (rule of law, government effectiveness, regulatory quality, control of corruption, voice and accountability, political rights, civil liberties, etc).

To improve competitiveness, measures are needed to increase the efficiency of institutions, improve education, improve markets, support business dynamism, etc., because these together will also affect the improvement of resource use efficiency.

Each country should study and identify its own efficiency and competitiveness-related strengths and weaknesses, in order to identify platforms and measures to increase competitiveness and efficiency.

Updating the legal framework according to the models of high-efficiency countries, carrying out functional reconstruction of public administration, and strengthening the judiciary remain strong points, thus they are key drivers in terms of increasing both efficiency and competitiveness.

LIMITATIONS

This research takes into account the aggregate country levels of GCI, governance, and economic freedom, but only some of their specific, though the most important components are included in the scope of our research.

The technical efficiency estimates are relative, in the sense that countries are less or more efficient in comparison with the best of those included in the study. If the best is omitted then obtained country estimates could be different. These estimates cannot be used to make comparisons with countries outside the region.

In the absence of the directly observable variables, the land area of the country and Gross Fixed Capital Formation are used as independent variables. However, these are only

proxies for natural resources and stock of capital, respectively. Thus, the efficiency estimates obtained from the regressions could be only indicative estimations.

WAY FORWARD

Low-efficiency countries should undertake well-structured qualitative and quantitative research in order to identify their specific weak and strong points of governance, rule of law, (property rights in particular), the functioning of public administration, markets and free trade, business climate, and measures to corruption control. The same investigation should be made to identify strong points in high-efficiency countries. Effective platforms for improvements in the above areas could be effective only when they are discussed and designed in coordination with civil society and universities. Effective measures and mechanisms to implement such platforms are crucial for their success.

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ANNEX

Figure 1. Four dimensions and 12 pillars of the Global Competitiveness Index

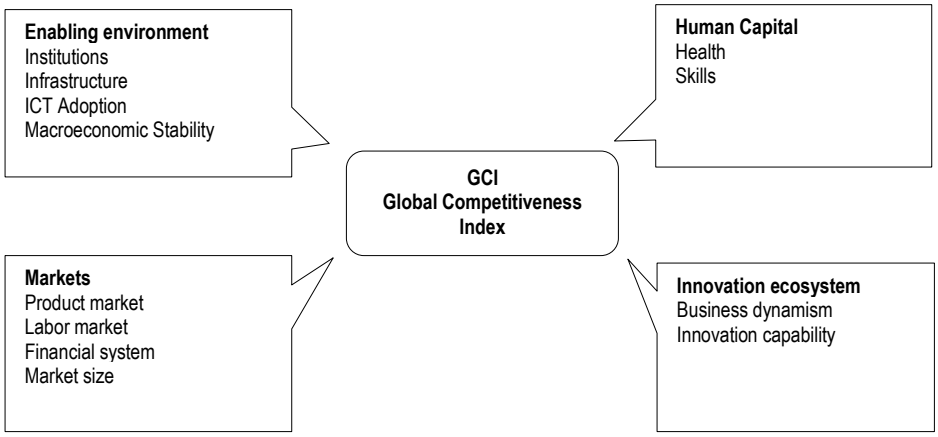

Figure 2. Good governance and its 10 Indicators

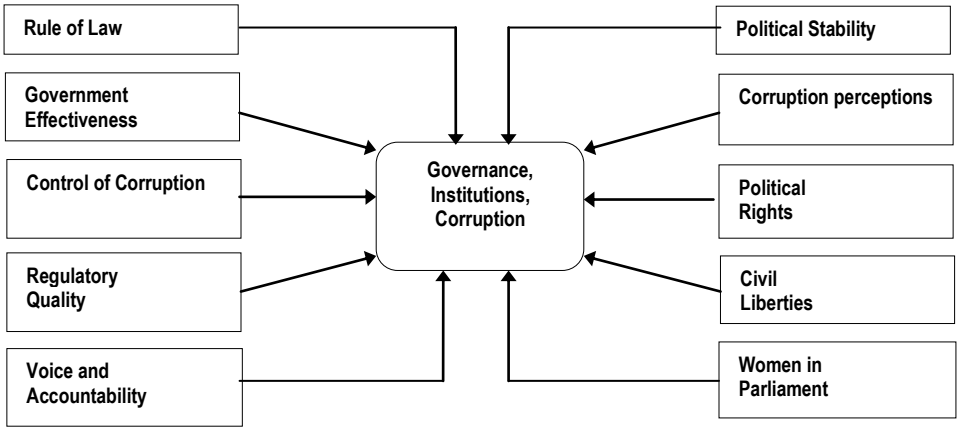

Figure 3. Economic freedom and its elements