

Convergence and socio-economic development disparities in the Balkan Peninsula

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Abstract. The last three decades in Europe have been marked by increased integration efforts. However, the religiously, culturally, and economically diverse Balkan Peninsula has in addition to that experienced disintegration. It affected the pace of development of economies and the disparities in the socio-economic development in the region. The aim of the study is to investigate the occurrence of regional convergence and to determine the level of disparity in the socio-economic development of the countries of the Balkan Peninsula. The study was conducted by means of taxonomic analysis, using data for the period of 2000–2019 drawn from the World Bank Open Data. The analysis focused on the relative distribution of GDP *per capita* (constant prices in USD in 2010) at country level. Sigma-convergence was assessed using the coefficient of variation of real GDP *per capita*. The presence of beta-convergence was verified using econometric modelling techniques, and more specifically, the linear regression analysis. Hellwig's taxonomic method of development was used for comparative assessment of the dynamics of changes in the level of socio-economic development of individual countries and for their classification.

The study shows that there is considerable diversity among the countries of the Balkan Peninsula in terms of their socio-economic development. It seems that the absolute beta-convergence observed in the region is caused by significant recession in Greece.

Keywords: development disparities, convergence, taxonomic analysis, Balkan countries

JEL: O47, O52, P25

Konwergencja i dysproporcje w rozwoju społeczno-gospodarczym na Półwyspie Bałkańskim

Streszczenie. Ostatnie trzy dekady w Europie upłynęły pod znakiem wzmożonych działań integracyjnych. Jednak zróżnicowany religijnie, kulturowo i ekonomicznie Półwysp Bałkański doświadczył również zjawiska dezintegracji. Wpłynęło to na tempo rozwoju gospodarek oraz dysproporcje w rozwoju społeczno-gospodarczym tego regionu. Celem badania omówionego w artykule jest prześledzenie występowania konwergencji regionalnej oraz określenie poziomu zróżnicowania rozwoju społeczno-gospodarczego krajów Półwyspu Bałkańskiego. Badanie przeprowadzono na podstawie danych zaczerpniętych z World Bank Open Data za okres 2000–2019, przy wykorzystaniu analizy taksonomicznej. Analizie poddano względny rozkład PKB *per*

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capita (ceny stałe w USD z 2010 r.) na poziomie kraju. Konwergencja sigma została oceniona przy użyciu współczynnika zmienności realnego PKB *per capita*. Obecność beta-konwergencji zweryfikowano za pomocą technik modelowania ekonometrycznego, a konkretnie analizy regresji liniowej. Do porównawczej oceny dynamiki zmian poziomu rozwoju społeczno-gospodarczego poszczególnych krajów i do ich klasyfikacji wykorzystano taksonomiczną metodę rozwoju Hellwiga.

Z badania wynika, że kraje Półwyspu Bałkańskiego wykazują znaczne zróżnicowanie pod względem rozwoju społeczno-gospodarczego. Wydaje się, że obserwowana w tym regionie bezwzględna beta-konwergencja jest wynikiem znacznej recesji panującej w Grecji.

Słowa kluczowe: dysproporcje rozwojowe, konwergencja, analiza taksonomiczna, kraje bałkańskie

JEL: O47, O52, P25

1. Introduction

The turn of the 20th and 21st centuries is an important period for Europe. It is a period marked by increased integration activity as well as advancing globalisation accompanied by internationalisation and disintegration. The processes of merging and unification are followed by the phenomenon of fragmentation, both in the political and social sense. A state individually defining its own needs is the subject of both of these seemingly opposite types of changes, and thus has to 'reconcile' them. However, it is a region – treated not as a geographical unit but as a separate international subsystem with its own characteristic model of behaviours, connections and institutions – which is increasingly often becoming the main object of interest both at country level and the level of global co-dependencies. The Balkan Peninsula, located at the geographical and political periphery of Europe, is such a region – with its distinct cultural, ethnic, religious and economic features.

The states selected for the analysis are linked to each other in different ways. Bulgaria, Croatia, Greece, Romania and Slovenia are the member states of the European Union. Croatia, Bosnia and Herzegovina, Serbia, Montenegro, North Macedonia and Slovenia used to be parts of the Socialist Federal Republic of Yugoslavia (Yugoslavia) for 70 years. All the analysed countries but Greece used to operate under different varieties of communist-socialist political and economic systems.

Ethnic diversity, the most characteristic socio-political feature of the region, also justifies the choice made. The largest ethnic group in the joint population of the analysed countries is South Slavs, who constitute the majority of the respective populations in Slovenia, Bulgaria, Serbia, Bosnia and Herzegovina, Croatia, North Macedonia and Montenegro. Bulgarians and North Macedonians speak their own Slavonic languages, and the Slavs from Serbia, Croatia, Bosnia and Herzegovina and Montenegro speak Serbo-Croatian dialects (Allcock et al., 2021).

Until the early 1990s, it was possible to distinguish three different economic systems in the Balkan Peninsula. Romania and Bulgaria operated within the first of them – as the Eastern Bloc countries, they had trade relations mostly with other members of the Comecon (the Soviet Union and other countries of the Central and Eastern Europe). Their economic relations with the neighbouring countries developed strictly according to the centrally established guidelines from the Comecon. Greece, as the EU member (since after the Maastricht Treaty), represented the second economic system. However, it was in some ways separated from the EU common market because of its geographical location. The western countries were Greece's main trade and finance partners, and its trade collaboration with the neighbouring states was not very intensive. Yugoslavia's single market constituted the third system. It separated the socialist economies from the capitalist zone, creating a kind of buffer between the two blocs. Such a situation favoured building advantageous relationships both with the Comecon and the western countries. However, Yugoslavia was not vitally interested in trade collaboration with its Balkan neighbours; such activity was only carried out under the arrangements with the Comecon and the European Union. From the mid-1960s, Yugoslavia's economy gained access to the Third World markets by joining the Non-Aligned Movement.

As a result of the peculiar economic division of the Balkan Peninsula, the area has underdeveloped structures for regional economic collaboration. Moreover, joining the European Union by some of its countries (Slovenia in 2004, Romania and Bulgaria in 2007, and Croatia in 2013), only strengthened the division of the Balkan Peninsula into two economically distinct areas – the Western Balkans and the EU countries.

The former consists of Albania, Bosnia and Herzegovina, Kosovo (unregulated status), Montenegro, North Macedonia and Serbia. The area of the former Yugoslavia developed as a relatively independent economic sphere for over 70 years, and had infrastructure that was developed comparatively well. However, the collapse of Yugoslavia in 1991 established new political borders within the former federation, and the political differences did not serve the development of the economic collaboration between the former republics. The accession of Slovenia and Croatia to the European Union reinforced the refocusing of their economies. The priority for the former Yugoslav republics was no longer the single market, but the economic collaboration with countries other than the former fellow republics (Zienkiewicz, 2015).

The other area within the Balkan Peninsula economically distinct from the Western Balkans is the European Union countries. Slovenia and Croatia enjoyed the benefits of the Yugoslav common market, whereas Bulgaria and Romania had

a marginal role in the economy of the Eastern Bloc. For example, until 2013, there was only one bridge between Bulgaria and Romania on a several hundred kilometre-stretch of the Danube, which significantly limited the exchange of goods between the countries of southern and northern Europe. As a result of the break-up of the former Yugoslavia and the outbreak of the armed conflict there, the economic situation in the region deteriorated. This affected the Greek economy, which encountered significant difficulties in the inland transport of goods to the EU. Redirecting it to sea routes was not always effective. Besides, between 1981 and 1990, Greece was the only European Union country where investments in tangible fixed assets in use were constantly decreasing (instead of increasing), averaging 0.4% per year (Rozkrut & Woreta, 2005). It should be stressed that Greece had a negligible inflow of foreign investment, which slowed down its development. This was due not only to the underdeveloped infrastructure, but also to Greece's macroeconomic policies, which were focused on ensuring political gain rather than stability and sustainable development. Greece's entry to the eurozone, possible only thanks to massive fraud and financial manipulation concealing the true state of the deficit, worsened the already fragile condition of the Greek economy (Sporek, 2013).

The aim of this article is to examine the occurrence of regional convergence and to determine the level of disparity in the socio-economic development of the countries of the Balkan Peninsula in relation to GDP *per capita*. The analysis has been carried out for the period of 2000–2019 at country level.

2. Literature overview

The demarcation of the land border of the Balkan Peninsula is usually disputed. Determining the exact area of a peninsula is difficult. Different classifications may be shaped by historical, cultural, linguistic, religious and geographical factors. Thus, it may happen that as a result of adopting different criteria for defining the Balkan Peninsula, a different area (different countries) is analysed. The Balkan Peninsula lies in Southern Europe. It borders the Adriatic Sea and the Ionian Sea to the west and the basin of the Aegean Sea and the Black Sea to the east. The Bosphorus, the Sea of Marmara and the Dardanelles separate it from Asia. It is one of the biggest peninsulas in the world. It is the third biggest peninsula in Europe – after the Scandinavian Peninsula and the Iberian Peninsula. Its total area is approximately 500,000 km², 950 km long and 1,260 km wide.

The Balkan Peninsula is single-row. It grows directly from the core of the continent (Desperak & Balon, 2003; Kądziołka et al., 2004). Its name probably comes from the Turkish *balkan* – a word used to describe the Haemus Mountains – from the estuary of the Timok to the Danube up to the Black Sea. According to Todorova (2009), however, all the existing etymological hypotheses of the *balkan*

toponym do not relate to the peninsula, but to the mountain range. John Morritt – a traveller of the 18th century – mentions a word *Bal-Kan* in his letters from the journey in this area (Morritt, 1985). The turbulent history of the Balkans has left its mark on the peninsula in the form of deep ethnic, religious, cultural, economic and political divisions. Even the name – the Balkan Peninsula (*Balkanhalbinsel*), seems to be fictitious, made up by a German geographer August Zeune at the beginning of the 19th century in order to avoid the then politically incorrect name ‘La Turquie d’Europe’ (Todorova, 2009, p. 26). Zeune (2012) was wrong thinking that the Balkan Mountains in Bulgaria are the northern geographical border of the region.

The beginning of the stabilization in the region, dating from 2000 and linked to the fall of Slobodan Milošević government in the Federal Republic of Yugoslavia, was abruptly interrupted by the global financial crisis. The countries of the Balkan Peninsula experienced and dealt with the effects of the crisis in different ways. This negative phenomenon contributed to an increasing imbalance in the regional development and the emergence of a trend manifesting itself in the faster economic growth of countries in economic transition than highly developed ones, called convergence.

Convergence is closely related to long-term economic growth (Solow, 1956). Economic growth theory discusses the factors affecting economic growth in different countries and tries to explain differences in their real income *per capita*. It can be assumed that in the early stages of the theory’s development, convergence research focused on the study of absolute convergence – the process by which economies with lower capital per worker grow faster than economies with higher capital per worker. A typical method of verifying the occurrence of beta-convergence was presented by Barro (1991). This approach consists in estimating the regression whose dependent variable is GDP growth in the analysed period, and the explanatory variable is the value of GDP in the initial period. This seemingly simple and widely-used approach was soon criticised. Friedman (1992) and Quah (1993) pointed out that using the Barro approach can often lead to a bias in the estimator of the convergence parameter, and suggested applying the coefficient of the variation of GDP *per capita* instead. Quah (1993) proposed an approach involving capturing the full dynamics of cross-country distributions of GDP *per capita*. Despite the emergence of alternative methods, the Barro regression approach remains the most popular one today, and has seen further extensions.

However, empirical studies have enforced sample homogeneity, thus introducing the concept of conditional convergence. It can be verified by beta-convergence and sigma-convergence. In the case of beta-convergence, GDP *per capita* growth negatively relates to the initial economic level, which means that beta-convergence is characterised by a negative slope of the linear function (Michelacci & Zaffaroni, 2000; Pfaffermayr, 2007).

Initial work on convergence is based on Solow's neoclassical growth (Solow, 1956). In their research, Barro and Sala-i-Martin (1992) explained that the American states in the period between 1840 and 1988 converged at the rate of 2% per year, regardless of the period analysed. The changes taking place in Europe after 1990, which have resulted in the convergence of the Central and South-Eastern European countries, have also been described in the literature. Researchers have paid particular attention to the countries of the Central and Eastern Europe (CEE) that joined the European Union. Their studies confirm the occurrence of both absolute and conditional convergence among those CEE countries that joined the EU in 2004 and 2007 (Mikulić et al., 2013; Szeles & Marinescu, 2010), and identify the relationship between the faster growth of the new EU members and the improvements in their factor productivity and the relatively intensive investment activity (Grzelak & Kujaczyńska, 2013). However, the results of Vojinović et al. (2009) analysis of the EU members which joined the union in 2004 over the period between 1992 and 2006 indicated that although poorer countries in this group tended to grow faster than the richer ones, the income gap between them remained significant. Other studies showed that the countries admitted to the EU in 2004 formed a homogeneous convergence club in the period between 1997 and 2012 (Dvoroková, 2014; Matkowski & Próchniak, 2004; Šikić, 2013). Its division into sub-periods revealed that they achieved high convergence rates in the pre-crisis period (1997–2007), and the level of their homogeneity decreased in the period between 2007 and 2012 (Šikić, 2013). Researchers studying economic convergence in the EU-27 between 1970 and 2010 pointed to the lack of the overall convergence of real income *per capita* in the EU and to the presence of different sub-groups that converged in different steady states during this period (Borsi & Metiu, 2015). An increase in total factor productivity and the capital increment with a small contribution of labour were identified as the main drivers of the convergence processes between the candidates and the potential candidates to the membership in the EU and the then-existing EU members in the period of 1993–2005 (Borys et al., 2008). Studies conducted for the above-mentioned period showed that the countries of the Central, Eastern and South-Eastern Europe converged with the 15 EU member states and have become relatively homogeneous (Çolak, 2015; Pipień & Roszkowska, 2018). The CEE countries in the period of 2000–2016 converged towards the EU-15 much more dynamically before the financial crisis of 2008. After the financial crisis, the dynamics of their convergence slowed down (Žuk et al., 2018).

Convergence studies do not avoid the Balkan countries either. Studies of the 1989–2005 period have shown the convergence of the Western Balkan countries with the EU-27 member states. Income inequality was increasing, and convergence in terms of GDP *per capita* progressed at a slow pace (El Ouardighi & Somun-Kapetanovic, 2009). Bićanić et al. (2016) proved that there was no beta-convergence

or sigma-convergence in Yugoslavia. Both types of convergence developed after the break-up of Yugoslavia and the emergence of new states. Similar results were obtained by examining the stochastic income convergence between the Western Balkan and CEE countries towards the EU-15 during the 1993–2015 period (Stanišić et al., 2018).

3. Research method

The research covers the Balkan Peninsula. In order to select the appropriate group of countries for the study, we adopted three criteria defining the political-administrative borders of the Balkan Peninsula:

- the Balkan Peninsula is the area of Europe south of the straight line connecting Odessa in Ukraine with Triest in Italy;
- where the line defined above divides a sovereign state and a minimum of 50% of the divided area lies below the dividing line, such a state should be subject to analysis;
- Slovenia was included in the analysis because of its belonging to the former Yugoslavia and several historical, multidimensional relations with that area.

Having applied the above criteria, the following countries have been taken into consideration in the analysis: Slovenia, Croatia, Bosnia and Herzegovina, Serbia (Central Serbia and Vojvodina only), Montenegro, North Macedonia, Greece, Albania, Bulgaria and Romania. Kosovo and Metohija have been excluded from the analysis due to the lack of a significant amount of data and unclear political status.

First, the dynamics of the relative distribution of GDP *per capita* (constant prices from 2010 in USD)¹ at the level of countries was analysed. The results are presented in the form of the initial and final distribution of relative GDP *per capita* and the change in relative GDP *per capita* by country over the period of 2000–2019.

Countries were divided into equal groups on the basis of quartiles of the distribution of the studied variable. In order to determine the degree of spatial diversity of socio-economic development of the study area, the variation of GDP *per capita* (constant prices from 2010 in USD) over time was examined.

The relative measure of regional diversity was determined by the coefficient of variation. Sigma-convergence and beta-convergence were assessed. Beta-convergence is defined as the relatively faster development of poorer regions than that of richer regions, causing the narrowing of the gap between them. Divergence is defined as the opposite phenomenon, reflecting the increase in developmental differences. There are two main concepts of convergence in the literature: sigma- and beta-convergence (Barro & Sala-i-Martin, 2004; Durlauf & Quah, 1999). Sigma-

¹ Further in the paper, all values of GDP *per capita* are expressed in constant prices from 2010 in USD.

convergence relates to changes in income distribution over time. It occurs when the dispersion of income *per capita* (or other phenomenon) between regions decreases over time. The concept of beta-convergence refers to the relationship between the average growth rate of income *per capita* and the initial income level. In the literature it appears in two variants. Absolute convergence assumes that poorer regions develop faster than richer ones, and that the lower the starting level of the former, the greater their growth in real GDP *per capita*. This means that regions become similar to each other regardless of the initial conditions. Conditional convergence, on the other hand, means that regions with similar structural parameters become more similar to each other.

Thus, regions with different characteristics converge to different income levels. Beta-convergence is related to income mobility between regions within the same distribution, and is necessary but not sufficient by itself for sigma-convergence to occur.

The study applied the beta-convergence research methodology of real convergence between economies developed by Baumol (1986). Using graphical projection of statistical data and observed relationships, he constructed the original growth equation:

$$\frac{1}{T} [\ln (y_{i,T}) - \ln (y_{i,t_0})] = \beta_1 + \beta_2 \ln (y_{i,t_0}) + \varepsilon_i, \quad (1)$$

where T is the end of time period, y_T is real GDP per worker at the end of time period, t_0 is the beginning of time period, y_{t_0} is real GDP per worker at the beginning of time period, β_1 is the intercept, β_2 is the slope parameter, ε_i is the statistical error term, and i is the index denoting the country.

For the purpose of this study, the Baumol equation was modified in the following way:

$$\frac{1}{T} \log \left(\frac{y_{i,T}}{y_{i,t_0}} \right) = \alpha + \beta \log (y_{i,t_0}) + \varepsilon_i. \quad (2)$$

Mathematically, the estimate of a regression model of cross-section data for the testing countries can be written as follows:

$$\frac{1}{T} \log \left(\frac{GDP_{i,T}}{GDP_{i,t_0}} \right) = \alpha + \beta \log (y_{i,t_0}) + \varepsilon_i, \quad (3)$$

where $\log GDP$ is the logarithm of gross domestic product *per capita*, α is the constant level, β the slope parameter, ε_i the random component, t_0 , T are the

indexes indicating time ($t_0 = 2000, T = 2019$), and i is the index indicating the country.

The parameters of the linear regression model for cross-sectional data were estimated using the ordinary least squares (OLS) method. The significance level of the model was set at 5%. Statistica software was used for the calculations. We used the F -test for testing the statistical significance of the model and the t -test for testing the individual parameters of the model. Autocorrelation was tested using the Durbin-Watson (D-W) test.

Based on the relative value of the measure of regional diversity, it is difficult to identify the most and the least developed countries among the analysed ones. In order to clarify this problem, a taxonomic analysis was carried out. The selection of indicators was made in such a way that the final set enabled us to answer which countries belong to the group of highly, medium-level or less developed countries.

Twenty variables were identified (Table 1) and extracted from DataBank – the World Development Indicators (the World Bank, 2021).

Table 1. Variables for 2000 and 2019

Symbol	Name	Measure	Nature of the variable
X_1	GDP per capita	constant prices from 2010 in USD	} stimulant
X_2	Gross fixed capital formation	} % of GDP	
X_3	Industry (including construction), value added		
X_4	Services, value added		
X_5	Agriculture, forestry, and fishing, value added		
X_6	Exports of goods and services		
X_7	Imports of goods and services		
X_8	New business density		
X_9	Research and development expenditure	% of GDP	} destimulant
X_{10}	Fixed telephone subscriptions	per 100 people	
X_{11}	Individuals using the Internet	% of population	
X_{12}	High-technology exports	current prices in USD	
X_{13}	Population density	people per sq. km of land	
X_{14}	Birth rate, crude	} per 1,000 people	
X_{15}	Death rate, crude		
X_{16}	Physicians		
X_{17}	Hospital beds		
X_{18}	Employment to population ratio, ages 15–24	} stimulant	
X_{19}	Unemployment		total national estimate (%) total (% of total labour force)
X_{20}	Inflation, consumer prices	national estimate annual (%)	} destimulant

Source: author’s work based on data from the World Bank (2021).

The selection of variables was based on data availability. The author is aware that the proposed data set represents relatively few variables, which may affect the final position in the classification of individual units of the studied area. However, the absolute identification of countries lying at the opposite poles of the scale of socio-economic development seems possible thanks to the method used and the fact that previous research indicated significant diversity in the degree of development of the study area (Stiperski & Lončar, 2008; Zienkiewicz, 2015). The set of variables used in the analysis was subjected to statistical verification due to the levels of correlation and of the coefficient of variation. Only those characteristics whose Pearson's linear correlation coefficient did not exceed 0.5, and whose coefficient of variation exceeded the value of 10%, were selected for analysis.

In the methodology of sciences it is assumed that ordering the surrounding reality is one of their basic goals. The taxonomy of socio-economic research defines the relations of creating a set of operational taxonomic units, formed from elements of the sets of objects (Y), characteristics (Z), and time units (T). Thus, a taxonomic analysis assesses the degree of differentiation of objects, described by a set of statistical characteristics. It allows the identification of clusters of these objects formed on the basis of similar levels of development, as well as obtaining homogeneous classes of objects in terms of the properties that characterise them (Kopczewska et al., 2016). This sort of research may additionally expand our knowledge on the category of objects concerned. We can assess the size of the contribution of each object to the development of the whole community, make a graphic visualisation of the problem, or determine the consistency, internal homogeneity and stability of the obtained grouping (Młodak, 2006). Using Hellwig's taxonomic method of development, a comparative assessment of the level of socio-economic development of individual countries was carried out (Grabiński et al., 1989). In order to determine the level of socio-economic development of the countries in the study area, selected describing features were used. Having established a pattern of economic development $y_{0j} = \max_i y_{ij}$ when j is stimulant, or $y_{0j} = \min_i y_{ij}$ when j is destimulant, taxonomic distances between individual countries and the benchmark object were established. The synthetic measure for each country was described by the formula:

$$d_i = 1 - \frac{c_i}{c_0}, \quad (4)$$

where d_i is the measure of development, c_{i0} is the taxonomic distance from each z_{ij} to the development pattern z_{0j} , and c_0 is the critical distance of a given unit from the pattern. The quantities used are expressed as:

$$c_{i0} = \sqrt{\sum_{j=1}^n (z_{ij} - z_{0j})^2}, \quad (5)$$

where

$$z_{ij} = \frac{x_{ij} - \bar{x}_j}{s_j}, \quad (6)$$

and

$$c_0 = \bar{c}_0 + 2s_d, \quad (7)$$

and

$$\bar{c}_0 = \frac{1}{n} \sum_{j=1}^n c_{i0}, \quad (8)$$

but

$$s_d = \sqrt{\frac{1}{n} \sum_{j=1}^n (c_{i0} - c_0)^2}. \quad (9)$$

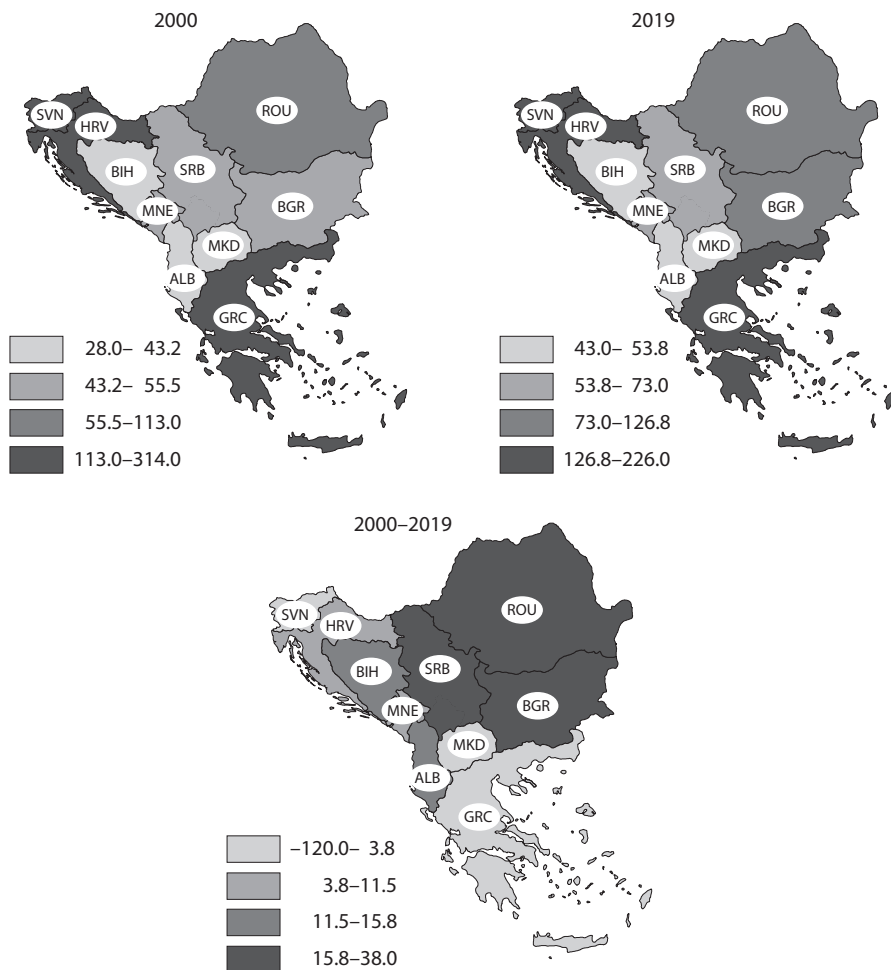
The classification was carried out according to the rule that the higher the value of Hellwig's taxonomic measure, the higher the dynamics of change in the development level of a studied country. The countries were then grouped by class. The boundaries of the class intervals were determined according to the following criteria: $(-\infty, \bar{d} - as_d]$, $(\bar{d} - as_d, \bar{d}]$, $(\bar{d}, \bar{d} + as_d]$, and $(\bar{d} + as_d, \infty)$, where \bar{d} is the arithmetic mean of the measure values, s_d their standard deviation, and a some constant (e.g. $a = 1$).

4. Results and discussion

First, the relative distribution of GDP *per capita* at the level of countries has been analysed (Figure 1). It shows the initial and final distribution of the relative GDP *per capita*, and the change in the relative income *per capita* between 2000 and 2019. On

each map, the countries of the Balkan Peninsula are divided into equidistant groups based on the quartiles of the distribution of the variable represented.

Figure 1. Distribution of relative GDP *per capita*



Note. ALB – Albania, BIH – Bosnia and Herzegovina, BGR – Bulgaria, HRV – Croatia, GRC – Greece, MNE – Montenegro, MKD – North Macedonia, ROU – Romania, SRB – Serbia, SVN – Slovenia. Right-closed intervals.

Source: author's work based on data from the World Bank (2021). Created using QGIS 2.8 Wienn.

A model as a whole is statistically significant at the 5%-level of significance. The value of the correlation coefficient R indicates that GDP *per capita* in each country is 82.6%, dependent on the development of explanatory variable, i.e. the initial levels of GDP *per capita* of the surveyed economies. The coefficient of determination R^2

indicates that the explanatory variable explains $\Delta \left(\frac{GDP_{i,2019}}{GDP_{i,2000}} \right)$ during the reporting period from 2000–2019 at 68.4% (Table 2).

Table 2. Summary of beta-convergence and estimates of parameters α and β of linear regression model

Index	Value	Standard error	t-test	p	Durbin-Watson	R	R^2	p F change
α	0.169	0.032	5.112	0.001	2.359	0.827	0.684	0.003
β	-0.036	0.009	-4.163	0.003				

Source: author’s calculations based on data from the World Bank (2021).

The result of the econometric model reflects the cross-section effect of the eight studied economies in the period from 2000 to 2019. Table 2 contains α , which corresponds with the average economic level in particular periods, assuming that the explanatory variable equals 0. The modelling of the economic levels of the Balkan economies in the period between 2000 and 2019 was done in order to check whether these levels converge or not. The carrier of such information is the β parameter.

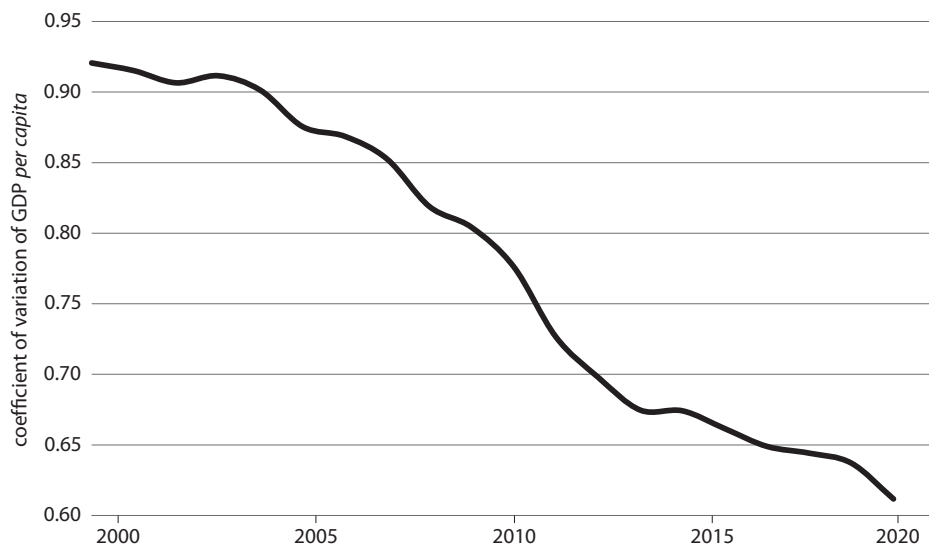
The modelling of the input variables resulted in the functional dependence relationship:

$$\frac{1}{T} \log \left(\frac{GDP_{i,T}}{GDP_{i,t_0}} \right) = 0.169 - 0.036 \log(y_{i,2000}). \tag{10}$$

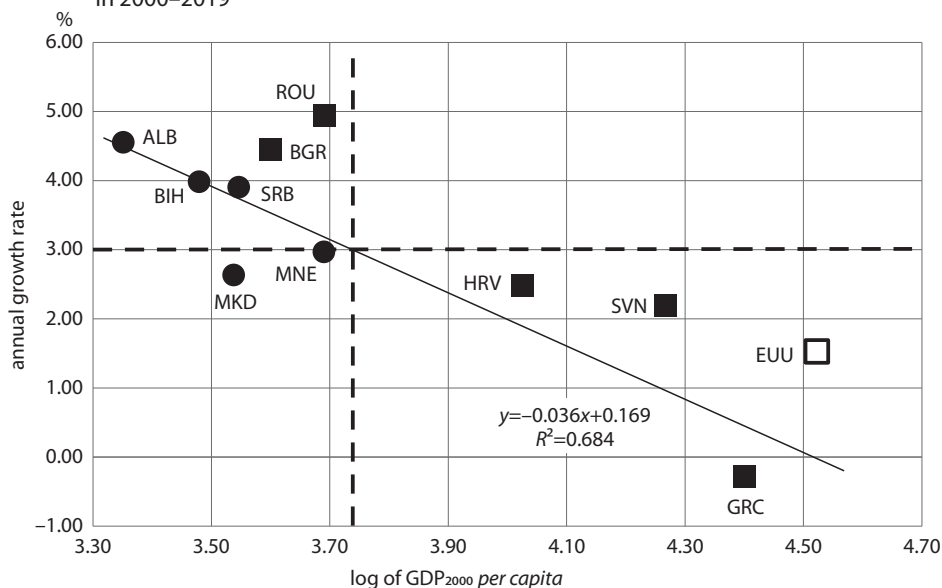
The negative value of parameter β (-0.036) suggests that the economic level of the tested countries converged. Because the presented model did not include the values of future explanatory variables, it can be applied to analyse the development of economic levels only ex-post.

In the next step, the hypothesis of sigma- and beta-convergence at country level were graphically verified. The analysis of sigma-convergence consists in analysing the changes in the coefficient of variation of relative GDP *per capita* across the countries (Figure 2).

The hypothesis of the existence of absolute beta-convergence can be tested by using a chart of the relationship between the average growth rate and the initial income for the countries of the region (Figure 3).

Figure 2. Sigma-convergence according to GDP *per capita* (constant prices from 2010 in USD)

Source: author's work based on data from the World Bank (2021).

Figure 3. Beta-convergence according to GDP *per capita* (constant prices from 2010 in USD) in 2000–2019

Note. As in Figure 1. EUU – European Union. Solid line: regression line; dashed lines: vertical axis – the average of the initial income of the study area, horizontal axis – the average growth rate in the study area. Dots: Western Balkans; filled squares: countries of the region which are members of the European Union; blank square: European Union.

Source: author's work based on data from the World Bank (2021).

Analysing the economic convergence between the studied countries, we need to ask whether initially less-developed countries have faster economic growth when economic growth in higher-developed countries is slowing. However, we must accept the hypothesis that the steady-state to which the economies of the study area converge is the average GDP *per capita*. This average is dynamic over time, and its value from year to year is 100. The answer to the question posed above can be found in Table 3.

Table 3. Economic growth in 2000–2019

Country	GDP <i>per capita</i> (AVG GDP p.c. = 100)		Change	Convergence process
	2000	2019		
Albania	28	43	15	} converged from below
Bosnia and Herzegovina	38	52	14	
Bulgaria	50	75	25	
Croatia	130	136	6	} converged from above
Greece	314	194	-120	
Montenegro	62	71	9	} converged from below
North Macedonia	43	46	3	
Romania	61	99	38	
Serbia	44	59	16	} converged from above
Slovenia	231	226	-5	

Note. AVG GDP p.c. – an average value of GDP *per capita* for the entire study area by year.

Source: author's work based on data from the World Bank (2021).

A taxonomic analysis of the studied objects was performed and their classification was done. Relative increments between 2000 and 2019 for the individual variables adopted for the taxonomic analysis were used to determine Hellwig's measure. The 2000 values of the variables were used as the basis for comparison. The classification of countries was based on the dynamics of their socio-economic development in 2000–2019 (Table 4).

Table 4. Ranking of countries according to the dynamics of change in Hellwig's taxonomic measure of development (2000–2019)

Country	Distance from the model c_i	Taxonomic development measure d_i	Rank
Romania	4.12	0.61	1
Bulgaria	5.16	0.51	2
Serbia	6.43	0.39	3
North Macedonia	6.43	0.39	4
Croatia	7.55	0.29	5
Montenegro	7.59	0.28	6
Slovenia	7.79	0.27	7

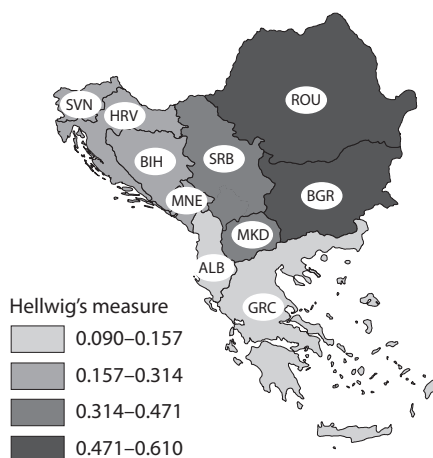
Table 5. Ranking of countries according to the dynamics of change in Hellwig's taxonomic measure of development (2000–2019) (cont.)

Country	Distance from the model c_i	Taxonomic development measure d_i	Rank
Bosnia and Herzegovina	8.37	0.21	8
Greece	9.51	0.10	9
Albania	9.63	0.09	10

Source: author's work based on data from the World Bank (2021).

The dispersion of the dynamics of change in the socio-economic development of the Balkan Peninsula countries in 2000–2019, with reference to Hellwig's taxonomic measure of development, is presented in Figure 4.

Figure 4. Dispersion of the dynamics of changes in the socio-economic development of the Balkan Peninsula countries in 2000–2019



Note. As in Figure 1. Right-closed intervals.

Source: author's work based on data from the World Bank (2021). Created using QGIS 2.8 Wienn.

The results of the study of the relative GDP *per capita* distribution at country level (Figure 1) showed that in 2000, the relative GDP *per capita* ranged from the average for Albania at 28.0% to the average for Greece at 313.8%. The poorest countries of the region were then Albania (28.0%), Bosnia and Herzegovina (37.6%), and North Macedonia (43.0%). The richest, apart from Greece, were: Slovenia (231.0%), Croatia (130.3%), Montenegro (61.8%), and Romania (61.1%). In 2019, Greece ceased being the richest country of the Balkan Peninsula. Slovenia, despite a fall in GDP *per capita* to 225.6% of the average, became the richest country of the region. The second richest country was Greece (193.5% of the average) and Croatia (135.9%) was the

third. Romania significantly increased its relative income *per capita* to the level of 96.8% of the average value of GDP. Albania (41.8%) and North Macedonia (46.3%) were the least affluent countries in 2019. It is significant that the countries which saw declines in relative income *per capita* included the richest ones, namely Greece (-120.3 p.p.) and Slovenia (-5.0 p.p.). Romania (+38.3 p.p.) and Bulgaria (+24.8 p.p.), on the other hand, saw the most spectacular increase.

As can be seen from the above and Table 3, some economies converged to the average for the study area from below, some from above, and in the case of one country (North Macedonia), no change in development was observed. This means that some economies are shrinking over time, which applies mainly to the most advanced economies of the region (Greece and Croatia). It seems that the significant economic slowdown observed in Greece caused an even greater deviation from the average for other Balkan countries. This is why growths of the underdeveloped economies were so spectacular.

The coefficient of variation in the period of 2000–2019 decreased steadily from 0.92 to almost 0.61, so it can be concluded that sigma-convergence had occurred, and the Balkan Peninsula area is characterised by considerable diversity of development.

The slope of the regression line in Figure 3 is negative, which also proves the occurrence of convergence among the Balkan countries in the analysed period. Positions of particular countries confirm the theoretical basis of beta-convergence, namely that initially poorer countries (Albania, Bosnia and Herzegovina, Serbia, Bulgaria and Romania) tended to grow faster than countries initially richer (Greece, Slovenia and Croatia). The study thus confirms the hypothesis of the absolute beta-convergence. Figure 3 is also a graphic representation of the relations between the average growth rates of individual countries (vertical axis) and their initial income (horizontal axis), and shows a close relationship between these variables. The results of the analysis demonstrate that between 2000 and 2019, the absolute beta-convergence among the Balkan Peninsula countries occurred. The poorer regions developed more slowly than the richer ones. The fastest growth of GDP *per capita* was observed in Romania (4.9%), Albania (4.6%) and Bulgaria (4.5%). The worst performers in this respect were Greece (-0.3%), Slovenia (+2.1%) and Croatia (+2.5%). The study also demonstrated that the countries of the Balkan Peninsula, with a much lower initial GDP *per capita* than the EU members, grew at a faster rate than the latter (except for Greece). As regards the two ex-Yugoslav EU members, Slovenia and Croatia, they recorded lower GDP *per capita* growth rates than the other ex-Yugoslav countries, but the growth rates of their economies were

nevertheless slightly higher than that of the EU as a whole. However, if we look at the two former Comecon countries that are now EU members, Romania and Bulgaria, we can see that they have a much higher rate of GDP growth *per capita* than the other EU countries. These findings are consistent with the results of earlier research on the convergence of the countries that joined the EU in 2004, which indicate that poorer countries in this group as well tended to grow faster than the richer ones, but nevertheless, the income gap between them remained significant (Vojinović et al., 2009). Our study also showed that the rates of convergence among the members of the EU located on the Balkan Peninsula are considerably varied. This might be indicative of heterogeneity within the EU (Cavenaile & Dubois, 2011).

Our study demonstrated moreover that Slovenia, Croatia and Greece, characterised by high initial GDP *per capita*, with the annual average growth of GDP *per capita* lower than the average, are the most developed countries of the Balkan Peninsula.

In the case of Slovenia, the impact of the global financial crisis on this country's economy was aggravated by its domestic problems. The Slovenian economy in 2006 and 2007 struggled with, among other difficulties, weakened price competitiveness, high indebtedness, and a growing current account deficit. Accession to the eurozone and the consequent reliance on the European Central Bank's monetary policy deprived the country of the possibility to use currency depreciation as a means to change or at least slow down the deteriorating trade balance (Ponikvar et al., 2014). The lack of adequate monetary policy mechanisms limited domestic actors' regulatory capacities as regards domestic economic activity and forging political trade-offs necessary to manage potential crises (Podvršič & Schmidt, 2018).

At first glance it seems that the 2007–2009 global financial crisis did not have any significant impact on Croatia's economy, but on closer examination it turns out it was otherwise. Both the Croatian economy and society are still dealing with the direct and indirect consequences of that crisis. The cause of the economic collapse in this country was identified as the immanent irrationality and paralysis of the system, which was no longer able to cope with the problem of the 'national interest in the globalised world' (Rohatinski, 2019). It seems Croatia is not yet prepared for another crisis. Between 1994 and 2008, the Croatian economy was characterised by comparatively high relative economic growth rates (Babić, 2006). One of the main drivers of that growth was domestic demand. Between 2009 and 2010, due to the decline in the income of the population, a nearly 10%-decline in domestic demand occurred (the World Bank, 2009). The current economic crisis related to the COVID-19 pandemic is likely to be more discernible in Croatia than the crises from

2007–2009 or 2012, the reason being the looming decline in the key sector of the Croatian economy – tourism. There are not many large players in Croatia that could absorb a significant number of the unemployed.

Greece appears to have been the greatest loser in economic terms during the period under review. Despite having the highest initial GDP *per capita*, its economy as measured by this indicator shrank by over 30% then. There are many reasons for that, with the defective economic structure cited most often. Researchers of the problem point to the high level of debt, high budget deficit, low competitive power, and unstable political structure of this state (Dudin et al., 2016; Ozturk & Sozdemir, 2015).

5. Conclusions

The topic undertaken by the author touches upon several aspects that are important from both the economic and political points of view. One of them is the socio-economic development of the countries of the study area in the context of the integration of some of them with the European Union. The study shows that Romania and Bulgaria experienced the highest growth of the relative GDP *per capita* in the period of 2000–2019. As post-communist countries with underdeveloped economies, they proved that their EU membership was not solely a political choice to reduce the Russian influence in the south-eastern part of the European continent. The twelve years of their membership in the EU have had a positive impact on their economies, at the same time strengthening the EU's position on the Balkan Peninsula.

Another aspect is the historical background. The countries of the Balkan Peninsula, burdened with different historical legacies and the resulting delays in development, still display significant disparities as regards their socio-economic progress. Examined by the coefficient of variation of GDP *per capita*, sigma convergence indicates that during the studied period, poorer regions developed faster than the richer ones. Absolute beta-convergence was also observed in the study area. The conclusion is that the initially underdeveloped countries seem to be catching up with the stronger economies, which is a very positive phenomenon.

The study also indicates that Slovenia and Croatia are the highest-developed countries in the region. At the beginning of the studied period, both of them could boast comparatively very high levels of GDP *per capita*, but their annual growth rates were lower than the average. Such a situation suggests that in the future, they might lose their strong economic position in the region. A similar yet worse forecast could be expected for Greece. As regards some other countries of the region, their low growth rates may indicate difficulties in the economic management resulting from

the loss of influence on the monetary policy (e.g. Slovenia) or the structural mismatch between the economies and current market requirements (e.g. Croatia and Greece). Lack of activity aimed at curing these deficiencies may lead to further deepening of crises in these countries.

The current economic crisis resulting from the COVID-19 pandemic affects every country in the world. The measures against COVID-19 have an impact on several economic sectors worldwide, but on the manufacturing, travel and tourism sectors to the largest extent. Tourism accounts for a significant part of GDP of all the countries of the Balkan Peninsula, but most notably so of Slovenia, Croatia, Greece and Bulgaria. Further development of the pandemic is almost sure to cause deep economic collapse in these countries. Therefore, it is possible that as a result of the pandemic, we will be able to observe the phenomenon of convergence in the studied area, resulting from the recession in the highly-developed economies of the region.

The study did not analyse the factors that cause poor regions to develop faster and richer regions to slow down. However, the question must be asked whether the observed convergence is the result of the growth of the underdeveloped economies, or the result of a significant recession in the richest countries. It is possible that Greece, Slovenia and Croatia have a problem with directing their policies towards solving developmental problems effectively. It must be also clearly stated here that given the geographical scope of this study, the results are determined at least in some part by the economic crisis in Greece. Nevertheless, Slovenia and Croatia remain the most developed countries of the region, which, as mentioned above, had comparatively high GDP *per capita* at the beginning of the period under review, and at the same time annual growth rates lower than the average.

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