Tourism and regional growth in the Carpathian Euroregion – a panel data approach

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Abstract

The paper focuses on the identification of the relationship between tourism and economic growth of the Carpathian Euroregion located across seven borders of Central and Eastern European countries (Slovakia, Ukraine, Poland, Hungary, and Romania). By analysing the relationship between tourism and economic growth within the region, the paper quantifies the positive impact of tourism on GDP growth per capita. To test for the existence and strength of such a relationship, we use a panel econometric model based on conditional β -convergence. The results confirm the tourism-led growth hypothesis, and determine the extent of regional disparities in tourism activities between different parts of the Carpathian Euroregion, observed during the increase in tourist attractiveness between 2005 and 2015. For Ukraine, where political instability has led to a decrease in the total number of visiting tourists, we show that the dynamics for its part of the Carpathian Euroregion are markedly different, as it has benefited from the changing structure of tourist flows.

Keywords: Tourism, cross-border regions, economic growth, Carpathian Euroregion, panel data

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Introduction

According to the World Tourism Organization, the tourism sector in 2017 accounted for 10% of the world's GDP, 7% of global trade and one in ten jobs, and served about 1 323 million international tourists (UNWTO, 2018). Despite the undeniable size and significance of tourism in the global economy, the literature does not present a clear consensus on causation within the tourism-economic development nexus, as this relationship has been shown to change in response to both local and global factors (Brida *et al.*, 2016; Ahmad *et al.*, 2020). In Europe, the relationship is not only affected by national policies towards tourism. European integration has led to the establishment of various frameworks and institutionalised forms of cross-border cooperation, which specifically affect the development of tourism. This state of affairs raises additional questions besides the existence and stability of the relationship between tourism and economic development in such areas. Economic convergence and differential dynamics between participating regional partners are also highly relevant. In this paper, we fill the gap in the understanding of these relationships by analysing tourism within the framework of the Carpathian Euroregion, which spans parts of Slovakia, Hungary, Poland, and Romania (all European Union member states) and Ukraine.

As Timothy (2001, 2006) states, since tourism spans different borders, border regions may be viewed as significant sources of tourist attraction, but they may also be subject to various restrictions, such as visa requirements. We have chosen to analyse the Carpathian Euroregion, the first Euroregion established exclusively by five post-communist countries: Poland, Slovakia, Hungary, Ukraine, and Romania. The mission of the Carpathian Euroregion is to form a *'common social-economic sphere using internal Carpathian potential and broad territorial partnership of public, private and nongovernmental sector entities for international development cooperation for enhancement of life quality of their residents'* (Lasek, 2015, p. 6).

The opening of the European Union's internal borders has created many opportunities for interaction and cooperation between cross-border regions. This cooperation is supported by the European Territorial Cooperation objective. In dealings among neighbouring EU countries, the European Neighbourhood Instrument (ENI) applies. ENI has replaced the European Neighbourhood and Partnership Instrument (ENPI), valid from 2007 to 2013, which followed the TACIS, CBC and MEDA programmes (Studzieniecki and Korneevets, 2016). One of the ENPI cross-border cooperation programmes included 'Programme Hungary-Slovakia-Romania-Ukraine 2007-2013'. This programme promoted deeper and more intensive social, economic and environmental cooperation, including the development of tourism between the regions of Ukraine and the regions of EU member states which shared a common border. The cooperation between these regions continued under the ENI Cross-Border Cooperation Programme from 2014 to 2020. The programme's scope does not cover the entire area of the Carpathian Euroregion, because the Podkarpackie region in Poland is included within other EU cross-border programmes. Apart from EU-wide programmes, there have been other treaties, such as the Carpathian Convention (2011), a multi-level governance mechanism intended to foster sustainable development and protection of the Carpathian region. The treaty was signed in 2003 and included seven Carpathian countries: Hungary, Slovakia, the Czech Republic, Poland, Romania, Ukraine, and Serbia. After the V4 countries joined the EU, the Carpathian Euroregion lost its international and political significance. In response to this, the 'Carpathian Euroregion Strategy 2020 & beyond' was introduced to boost cross-border cooperation. Despite all these efforts, some authors (e.g., Benč, 2014) claim that the Carpathian Euroregion is an example of a cross-border region in which the coordination of individual programmes does not work.

The paper aims to identify the relationship between tourism and economic growth of the Carpathian Euroregion. To test for the existence of such a relationship, and to gauge its strength, we have used a panel econometric model based on conditional β -convergence. We have focused on regional disparities in tourism among different parts of the Carpathian Euroregion, and the region's tourist attractiveness, in the period 2005-2015. One of the fundamental challenges in analysing cross-border tourism is data availability and comparability. We have addressed this problem by conducting our analysis on ten NUTS 2 regions, whose combined area coincides with the Carpathian Euroregion, carefully augmenting this with data from several official sources for Ukraine.

The rest of the paper is organised as follows: the next section is a review of the literature on the relationship between tourism and economic growth. After this the Carpathian Euroregion and the most relevant features of its tourism are discussed. Next comes a description of the data sources and methodology, followed by a descriptive analysis of selected tourism indicators and indicators of economic and social development within the parts of the Carpathian Euroregion. After this comes a presentation of the econometric results of the conditional β -convergence model. The final section provides a conclusion.

Literature review

Within economic literature, tourism is often described as an economic development factor (Pablo-Romero and Molina, 2013). Tourism plays an important role in the planning and management of local economic development (Stynes, 1997). The total economic effects of tourism may be divided into direct, indirect, and induced effects. The direct effects of different tourism industries are usually measured in terms of the contribution of tourism to GDP within the Tourism Satellite Account (TSA). This provides relevant tourism touristic information, but only at the country level. The indirect effects, according to Jucan and Jucan (2013), result from investment spending, such as the construction of new hotels, government travel, and spending related to tourism, such as administration and security services, the marketing and promotion of tourism, and purchases from suppliers. The induced effects consist of the impact of spending by people directly or indirectly employed within the tourism touristic sector.

The overall impact of tourism on a region's economic growth may be estimated by means of an input-output analysis, which enables estimation of both the indirect and induced effects. Another approach is an econometric analysis of direct and indirect effects, of the kind conducted by Holzner (2011), which showed that countries with higher incomes from tourism experienced higher economic growth, as well as higher levels of investment and secondary-school enrolment. The analysis showed that most of the indirect effects of tourism are mediated through physical and human capital channels. Gökovali and Bahar (2006) used a panel data approach to estimate growth models, using tourism receipts as a percentage of exports for Mediterranean countries. The study follows the hypothesis of export-oriented economic growth, whereby tourism brings in foreign currency, which leads to the development of the tourism sector and causes multiplier effects in other sectors of the economy.

Antonakakis, Dragouni, and Filis (2015, p. 142) formulate four hypotheses to determine causal links: either from tourism to economic growth (the Tourism-Led Growth hypothesis, or TLG); causation in the opposite direction, when tourism is affected by economic developments (the Economic-Led Tourism hypothesis, or ELT); bidirectional causality; and a 'no causality' hypothesis. In this paper, we will test the first hypothesis. A possible formal theoretical framework supporting the TLG hypothesis, based on a multiplier-accelerator growth model, has been proposed by Pérez-Montiel *et al.* (2021).

According to Pablo-Romero and Molina (2013), empirical papers which analyse the TLG hypothesis can be classified into time series, panel data, and cross-sectional studies. Schubert, Brida, and Risso (2011) use cointegration analysis to confirm a long-run relationship between the variables of economic growth, international tourism earnings, and the real exchange rate. Evidence supporting the TLG hypothesis was provided also by Proença and Soukiazis (2008), who used the conditional convergence approach of Barro and Sala-i-Martin (1992) to test for convergence among four Southern European countries, namely Greece, Italy, Portugal and Spain. Their results indicate that tourism should be viewed as a driver for convergence. Du, Lew, and Ng (2016) have tested the TLG hypothesis by extending the Solow model (1956) in a cross-section of 109 countries. They find that investments in tourism in and of itself are insufficient for economic growth, and recommend a diversified economic development strategy. Evidence in favour of the TLG hypothesis has been provided for Pacific Island countries by Narayan *et al.* (2010), for Latin American countries by Fayissa, Nsiah, and Tadesse (2011), for Mediterranean countries by Dritsakis (2012), and for Romania by Surugiu and Surugiu (2013). Chou (2013) analysed 10 transitional countries (Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, Slovakia, and Slovenia) over the period 1988–2011. Vašaničová, Litavcová, and Lyócsa (2016) studied the dependence on tourism activity of four Central and Eastern European countries (Poland, Slovakia, Hungary, and the Czech Republic). They found statistically significant co-movement between the V4 countries using monthly data on the nights spent at tourist accommodation establishments. Liu and Wu (2019) have explored the link between productivity and economic growth using a Bayesian dynamic stochastic general equilibrium model. This showed that while advances in total productivity positively affect the influx of tourism from abroad, productivity in tourism has specifically beneficial effects on local demand for tourism.

The relationship between tourism and economic performance has also been studied at the regional level. Paci and Marocu (2014) confirmed that domestic and international tourism has a positive impact on regional growth in the EU. Soukiazis and Proença (2008) analysed regions in Portugal. Their panel data estimation approach for conditional convergence provides evidence for the impact of tourism on income growth per capita and a speeding of the convergence rate. Andraz, Norte, and Gonçalves (2015) confirmed this positive impact of tourism on regional convergence in Portugal. Their study's findings imply that the tourism promotion policies of national or regional governments may contribute to economic growth and a reduction of regional asymmetries. An extensive review of papers on the TLG hypothesis may also be found in Brida, Cortes-Jimenez, and Pulina (2016). Positive correlation with economic growth, as well as convergence within European countries, has also been confirmed by Romão (2020) and Ekonomou and Kallioras (2020).

Even though the relationship between tourism and economic growth may seem clear, several studies reject the TLG hypothesis, such as Katircioglu (2009) on Turkey and Oh (2005) on South Korea. Po and Huang (2008) have observed a non-linear relationship between international tourism receipts as a percentage of GDP and economic growth in cross-sectional data for 88 countries. In eight countries, they were unable to identify a significant relationship between tourism and economic growth. Eugenio-Martin, Morales, and Scarpa (2004) have analysed Latin American countries, finding a positive effect of the per capita growth rate for tourism on economic growth. Differentiating countries by their per capita levels of income, they observed that tourism affects economic growth only in medium or low-income countries. Different results have been observed by Cárdenas-García, Sánchez-Rivero, and Pulido-Fernández (2015). Using a sample of 144 countries, they have observed that tourism growth has led to an improvement in economic development only in well-developed countries, including all the countries that make up the Carpathian region. These authors are critical of the idea that tourism is a general solution for development and the reduction of poverty. In less developed countries, tourism may be less

effective in improving living conditions than other economic activities. More recently, Lin *et al.* (2018) provide evidence suggesting that while less developed economies benefit from both TLG and ELT, larger countries (in both the geographical and economic senses) tend to experience tourism-led growth. To address not just the potential benefits, but also the potential risks from the interactions of high intensity and seasonality, Batista e Silva *et al.* (2018) have constructed a regional vulnerability index for tourism.

When considering the methodological aspect of assessing the relationship between tourism, regional development and growth, the available literature offers several different approaches. These range from essentially descriptive approaches (e.g., Tosun *et al.*, 2003) to more complex econometric approaches, usually based on panel regression models, or even spectral methods (Gül and Özer, 2018).

Fayissa *et al.* (2008) used panel data for 42 African countries to analyse the contribution of tourism to economic growth and development within a conventional neoclassical framework. Tugcu (2014) has used panel unit root and cross-sectional dependence techniques to test for a causal relationship between tourism and economic growth, providing evidence for its existence in both Europe and Asia. Yang and Fik (2014) have analysed spatial effects in tourism growth using a geographically weighted framework accounting for spatial heterogeneity. Li *et al.* (2016) explored economic convergence in China, using a spatiotemporal model to account for spatial and temporal dependence, and found that domestic tourism was more significant than international tourism. Dritsakis (2012) studied economic growth and tourism in seven Mediterranean countries using the heterogeneous panel cointegration technique. Webster and Ivanov (2014) used growth decomposition to measure the impact of tourism on economic growth in a cross-sectional analysis of 131 countries, while Lee and Chang (2008) used a heterogeneous panel cointegration technique on a sample of OECD and non-OECD countries.

The Carpathian Euroregion

The concept of Euroregions is not new. The oldest Euroregion, 'EUREGIO', also called the Gronau Euroregion, was established in 1958 between Niedersachsen and Nordrhein-Westfalen in Germany and parts of the Dutch provinces of Gelderland, Overijssel and Drenthe (Durà *et al.*, 2018). Today there are more than 80 different Euroregions, fostering cooperation between the countries of Europe. A Euroregion may be defined as 'a territorial unit formed by two contiguous sub-national units belonging to two separate states' (Perkmann, 2002). Cross-border cooperation is the essence of the Euroregion. Euroregions are established by various legal frameworks, such as the European Grouping of Territorial Cooperation (EGTC), the European Economic Interest Grouping (EEIG), the Local Grouping of Territorial Cooperation (LGTC), public legal agreements or private legal associations.

Durà *et al.* (2018) identify three general objectives in the creation of Euroregions: the creation of forums for exchanging experiences, the development of regional projects (within the Euroregion, or in combination with other actors), and the provision of specific services, such as international airports or hospitals. The history of the Carpathian Euroregion spans over 20 years and is based on geographic, economic, and political factors. It was the first Euroregion to be established in Central Europe after the fall of the Iron Curtain (Bauer, 2015). In 1993, the representatives of Poland, Ukraine, and Hungary signed the founding documents, in a joint effort to preserve regional stability and to create a framework for resolving disputes that might arise among their numerous national minorities. Romania became a full member of the group in 1997, followed by Slovakia in 1999. With a territory of 145 000 km² and 14.2 million inhabitants (Benč *et al.*, 2015), the Carpathian Euroregion is one of Europe's biggest euroregional structures. The Carpathian Euroregion contains diverse ethnic, cultural, and religious contexts, and has a complex history of frequent border changes (Bauer, 2015). Its geographic and natural environment includes the Carpathian Mountains, one of the largest mountain ranges in Europe. The

priority areas of cooperation set out in the founding documents of the Carpathian Euroregion include: coordination of joint activities; cooperation in the fields of economics, science, ecology, education, culture, and sport; collaborative cross-border projects; and collaboration with international institutions and organisations (Lasek, 2015).

According to Benč *et al.* (2015), the most successful period for the Carpathian Euroregion was between 1993 and 2004. After the V4 countries (the Czech Republic, Hungary, Poland, and Slovakia) entered the EU, the intensity of cooperation diminished. The frontiers with Ukraine became some of the best-guarded land borders in the Schengen Area. The tightening of visa policy in 2007 also caused a significant decrease in the number of travellers (Benč, 2014), which lasted until the EU visa liberalisation of 2017. The member regions still face common problems, as they are all classified as peripheral regions and share similar economic characteristics. Tanaka (2006) lists several structural issues affecting the Carpathian Euroregion, such as poor decision-making and participation, lack of independent revenue sources and lack of human capacities. According to Benč *et al.* (2015), these countries also have different public administration models, with differing competencies held by the various regional authorities.

The Carpathian Euroregion offers a great diversity of tourist attractions. There are historic cities and unique natural attractions. There is a wide range of highly competitive tourist resorts, offering recreations from mountain sports to spa treatment. (However, many spa facilities in the region require modernisation.) The Carpathian Mountains contain a wide diversity of plant and animal life. Due to the inaccessibility of some parts of the territory, many natural habitats have been preserved in their original form. The uniqueness of Carpathia has also been recognised by UNESCO (Euroregion Karpacki, 2010). Several of its natural and cultural locations have been added to the UNESCO World Heritage list. The Carpathian Euroregion attracts many young people, as its services are reasonably priced (Euroregion Karpacki, 2010). In general, the Carpathian Euroregion has good potential for tourism. Nonetheless, there are also some significant challenges in relation to tourist infrastructure and services, and the effectiveness of tourist marketing (Benč *et al.*, 2015).

Data and methodology

Our study's objective is to analyse tourism in the Carpathian Euroregion in relation to the region's economic growth. The study of cross-border regions faces several problems in terms of data availability and comparability. To address this, the scope of the study has been extended. We follow Eurostat's regional classification, which provides regional tourism statistics at the NUTS 2 level (see Table 1 for the differences between the geographic areas). We have enhanced the sample by including the Nógrád county, which is part of Northern Hungary, as well as the Bistrița-Năsăud, Cluj and Bacău, Iași, Neamț and Vaslui counties, which are parts of Romania. We have decided to exclude the Harghita county as it is the only one of six counties of the NUTS 2 Centru region in Romania. Therefore, the main differences arise in relation to Romania. Our approach is compatible with the territorial concept proposed by the Carpathian Horizon 2020 development strategy.

Data sources

The data on tourism and economic indicators have mainly been obtained from Eurostat (2017), the State Statistics Service of Ukraine (2017), Kalachova (2012a; 2012b; 2013a; 2013b), and Karamazina (2015a; 2015b). The descriptive analysis was conducted for 2015 onward, due to data availability for all variables. Financial data are expressed in EUR, while the average official exchange rate of hryvnia to EUR has been used to express GDP per capita, capital investments and net disposable income for the Ukrainian regions. Ukraine was affected by significant exchange rate fluctuations in 2008, 2009, 2014, and a substantial fall in 2015.

Table 1. *Carpathian Euroregion vs. area under analysis*

Country	Carpathian Euroregion	Area under analysis
Hungary	Borsod-Abaúj-Zemplén county, Heves county	NUTS 2 Northern Hungary (Észak-Magyarország which also includes Nógrád county)
	Hajdú-Bihar county, Jász-Nagykun-Szolnok county, Szabolcs-Szatmár-Bereg county	NUTS 2 Észak-Alföld (Northern Great Plain)
Poland	Podkarpackie Voivodeship	NUTS 2 Podkarpackie
Romania	Bihor county, Maramures county, Satu Mare and Sălaj	NUTS 2 Nord-Vest (include also Bistrița-Năsăud and Cluj)
	Botosani county, Suceava county	NUTS 2 Nord-Est (include also Bacău, Iași, Neamț, Vaslui)
	Harghita county (from NUTS 2 Centru)	
Slovakia	Prešov and Košice region	NUTS 2 Eastern Slovakia
Ukraine	Chernivtsi region, Ivano-Frankivsk region, Lviv region, Zakarpattia region	Chernivtsi region, Ivano-Frankivsk region, Lviv region, Zakarpattia region

Source: Carpathian Euroregion and EU NUTS 2 classification.

Our statistical indicators representing the supply and demand of tourism include numbers of beds, net occupancy rates, tourist arrivals, and numbers of overnight stays. All indicators (unless stated differently) represent all tourist accommodation establishments. In the case of Ukraine, we have summarised the data for all collective facilities provided by legal entities and individual entrepreneurs. Although GDP and its growth rate are the most widely used indicators for evaluating regional economic development, as a robustness check we have also used net disposable income per capita, and the employment and unemployment rates. Pablo-Romero and Molina (2013) showed that the degree of specialisation in tourism is a significant factor affecting the relationship between tourism and economic growth. Holzner (2011) maintains that countries which have a higher share of tourism income in their GDP grow faster than others.

In contrast to those papers, Sequeira and Campos (2007) deny any positive link between specialisation in tourism and economic growth. Specialisation in tourism at the country level is usually calculated in terms of tourism receipts as a percentage of GDP or as a percentage of exports. In our case, it is not possible to use this index; instead, we have used the specialisation index proposed by Paci and Marrocu (2014), namely, the share of beds in tourist establishments relative to regional GDP.

Model description

We analysed the impact of tourism on economic growth for 2005–2015 by employing a conditional β -convergence model, following Barro and Sala-i-Martin (1992). The topic of economic convergence and economic growth has been extensively researched (e.g., De la Fuente, 1997; Eckey and Türk, M., 2007, Goecke and Hüther, 2016; Výrostová, 2016; Furková a Chocholatá, 2017, Butkus et al., 2018). The β -convergence model is based on Solow's neoclassical growth model (1956), a growth regression framework with the level of initial income as the key explanatory variable. Conditional convergence models allow steady states to differ across regions. Other explanatory variables include the investment ratio, population growth, tourism variable, and exchange rates. We have augmented the traditional convergence model by adjusting exchange rates to account for periods of high volatility in Ukraine, caused by the global financial crisis in 2008 and 2009 and political instability in 2014 and 2015. The

specific choice of the tourism intensity variable was influenced by data availability for the whole period analysed. To characterise the demand side, we have selected 'tourist arrivals at hotels and similar accommodation per capita' to represent domestic and foreign tourists.

The empirical model is specified in the following per capita log-linear form similar to Mohl and Hagen (2010):

$$\ln\left(\frac{y_{i,t}}{y_{i,t-1}}\right) = \beta_0 + \beta_1 \ln(y_{i,t-1}) + \beta_2 \ln(inv_{i,t-1}) + \beta_3 \ln(n_{i,t-1} + g + \delta) + \beta_4(arrivals_pc_{i,t}) + \beta_5(exr_{i,t}) + u_i + \varepsilon_{i,t} \quad (1)$$

where $i = 1, 2, \dots, 10$ denotes the NUTS 2 regions, and t is a time index encompassing the periods 2005 to 2015.

Our explanatory variable is the annual rate of per capita GDP growth. Because of the short time horizon, we have decided not to calculate the average GDP rate over a five-year period, as proposed by Islam (1995). The limitation of this approach is that we cannot eliminate the influence of economic-cycle fluctuations, and our observations are more likely to be serially correlated. The explanatory variables are expressed in lagged form, except for the tourism indicator and the alteration in the exchange rate. We have used a one-year lag, similar to that of Mohl and Hagen (2010). The variables include:

- $y_{i,t-1}$ – initial level of GDP per capita (in our case GDP per capita of NUTS 2 region i in the previous year), calculated from the data of GDP in EUR and average annual population,
- $inv_{i,t-1}$ – capital investment to GDP, calculated from the data of gross fixed capital formation,
- $n_{i,t-1}$ – annual growth rate, calculated from the data of population on January 1st,
- $arrivals_pc_{i,t}$ – total tourist arrivals at hotels and similar accommodation per capita, calculated from average annual population data,
- $exr_{i,t}$ – change in the exchange rate, computed from annual averages from the European Central Bank and the National Bank of Ukraine,
- u_i – fixed regional effects,
- $\varepsilon_{i,t}$ – error term for the region and time.

Following Mankiw, Romer, and Weil (1992), we assume that the rate of technological progress (g) and rate of depreciation (δ) are not varying across the regions and over time, and that their total effect is equal to 0.05. A negative sign of the regression coefficient β_1 would indicate that the less developed regions are catching up with the richer ones, confirming the hypothesis of conditional β -convergence between regions. We expected to find a positive impact by investments and tourist arrivals on economic growth (e.g., Dritsakis, 2012; Brida *et al.*, 2016). Changes in exchange rates should explain part of the GDP growth fluctuation, so we expect β_5 to be different from 0.

The convergence equation (1) is estimated as a panel model, as the data includes information about the cross-sectional dimension and the evolution over time. In our case, the sample is represented by ten regions for eleven years, resulting in a sample of 110 observations (the panel is balanced). As Sequeira and Campos (2007) note, panel data increases the degrees of freedom.

Table 2. *Economic characteristics of the Carpathian Euroregion in 2015*

Region	Regional GDP per capita [EUR]	Net disposable income of households per capita [EUR]	Employment rate of the age group 15-64, in case of Ukraine age group 15-70 [%]	Unemployment rate [%]
Northern Hungary (HU)	7 303	5 000	59.0	8.7
Észak-Alföld (HU)	7 044	5 000	58.9	10.9
Podkarpackie (PL)	7 900	5 100	57.4	11.6
Nord-Vest (RO)	7 075	4 200	69.9	4.6
Nord-Est (RO)	4 862	3 300	65.3	3.6
Eastern Slovakia (SK)	10 116	6 900	57.6	15.0
Zakarpattia (UA)	839 (2 940)*	895 (3 135)*	61.9	9.2
Ivano-Frankivsk (UA)	1 369 (4 795)*	1 063 (3 722)*	59.8	8.4
Lviv (UA)	1 541 (5 397)*	1 188 (4 159)*	60.5	8.2
Chernivtsi (UA)	949 (3 323)*	955 (3 345)*	60.5	9.3

Note: * Data for the Ukrainian regions were also calculated by conversion using exchange rates from 2007, the year before the financial crisis, to eliminate the impact of later hryvnia depreciation (numbers in brackets).

Source: Eurostat (2017), the State Statistics Service of Ukraine (2017) and authors' calculations using average annual number of inhabitants and average yearly exchange rates.

Results

Descriptive analysis

To evaluate the economic situation of the Carpathian Euroregion, we have used regional GDP per capita, net disposable household income, and selected data from regional labour market statistics. As we can see from Table 2, all the EU members of the Carpathian Euroregion share similar characteristics: they all belong to a group of less-developed regions within the EU and their home countries. They are also quite distant from their respective capitals. When we consider the regional GDP in purchasing power standard (PPS) per inhabitant as a percentage of the EU28 average, the EU member regions cover the range from 36% for Romania Nord-Est to 53% for Eastern Slovakia in 2016. Regional GDP per capita in EUR and net disposable income of households per capita are quite similar among all the regions belonging to the EU except for Romania Nord-Est and Eastern Slovakia. Eastern Slovakia suffers from a higher unemployment rate than all other regions (12% in 2017), and Romania Nord-Est, despite a very low unemployment rate (2.9% in 2017), shows weak economic performance.

Table 3. *Selected tourism indicators of the Carpathian Euroregion in 2015*

Region	Specialisation index	Number of beds	Net occupancy rate of bedplaces ¹ [%]	Tourist arrivals	Total tourist's arrivals per 1000 inhabitants	Average length of stay
Northern Hungary (HU)	1.44	48 930	29.8	1 077 974	930	2.33
Észak-Alföld (HU)	1.22	51 138	29.8	847 085	574	2.71
Podkarpackie (PL)	1.03	28 711	28.3	957 687	460	2.90
Nord-Vest (RO)	0.86	31 938	33.6	1 137 068	441	2.38
Nord-Est (RO)	0.86	27 908	29.5	936 107	287	2.06
Eastern Slovakia (SK)	1.45	57 091	29.8	989 948	612	2.94
Zakarpattia (UA)	2.89	16 930	19.5	230 000	183	5.98
Ivano-Frankivsk (UA)	1.31	12 186	24.8	282 585	204	4.29
Lviv (UA)	1.75	33 626	20.8	715 333	282	4.48
Chernivtsi (UA)	1.27	4 751	13.7	107 236	118	2.54

Note: ¹ In the case of Ukraine, the net occupancy rate of beds in hotels and similar accommodation is calculated as a weighted average of capacity utilisation rates for legal entities and individual entrepreneurs.

Source: Eurostat (2017) and the State Statistics Service of Ukraine (2017).

When considering economic performance, the situation in the Ukrainian regions is markedly different. Regional GDP per capita, as well as the net disposable income, are significantly lower. In 2014, there was a 30% decline in GDP per capita compared to 2011-2013, mainly due to the change in Ukraine's political situation and the change in exchange rates. In 2015 the halving of the hryvnia exchange rate led to a fall in GDP per capita of 20%. On the other hand, employment rates and unemployment rates in Ukraine's regions are similar to the Hungarian areas and better than in Eastern Slovakia or Poland's Podkarpackie. The impact of tourism on GDP and employment depends on how great a share tourism makes up of the economy of a given region, and its interrelations with other sectors within the region (Aguayo, 2005). Following Paci and Marrocu (2014), we have calculated a specialisation index consisting of the regional share of beds available in tourist accommodation relative to the regional GDP share. As we can see in Table 3, all regions except for Romania reach values above 1, suggesting they are relatively specialised in tourism activities.

The highest value was identified for the Zakarpattya region, followed by Lviv. These regions specialise in tourism, and had previously been dominated by Crimea. Crimea had been Ukraine's most popular destination, providing the country with its largest source of tourist income. In 2013, 30% of domestic and foreign tourist expenditure on package holidays in Ukraine was spent in Crimea. After the Russian annexation of Crimea and the armed conflict in Donetsk and Luhansk, Lviv achieved the second-highest share of income from tourism (17%, after the city of Kyiv with 29%). According to our calculations, which are based on data from the State Statistics Service of Ukraine, in 2015 Lviv and Zakarpattya had the highest volumes of tourism receipts as percentages of Ukrainian GDP (both at around 1.5%).

The number of bed places is an essential indicator of a region's capacity to respond to tourist demand. The highest accommodation capacity is found in Eastern Slovakia, followed by the Hungarian regions. The Polish and Romanian regions have only half as much capacity to respond to tourist demand. Table 3 shows no significant differences between net occupancy rates of bed places among Carpathian EU regions. In the case of Ukraine, occupancy rates are substantially lower than those in other regions. Looking at the total arrivals in tourist accommodation establishments per 1 000 inhabitants, we can see that the most visited region is Northern Hungary, followed by Eastern Slovakia, where tourists stay for a longer time (see Table 3). The average length of stay shows regional disparities, ranging from 2.06 nights in Romania Nord-Est to 5.98 nights in Zakarpattya. The political and economic situation in Ukraine has led to a sharp reduction in the length of stays compared with 2014, in Zakarpattya's case by 1.13 days and in Lviv by 2.4 days.

Table 4. *Nights spent in tourist accommodation establishments in 2015*

Region	Total nights spent	Total nights spent per 1000 inhabitants	Total nights spent by non-residents [% of total]
Northern Hungary (HU)	2 509 657	2 164.9	15.8
Észak-Alföld (HU)	2 295 445	1 554.2	26.7
Podkarpackie (PL)	2 772 613	1 330.5	7.7
Nord-Vest (RO)	2 706 339	1 048.5	16.4
Nord-Est (RO)	1 925 204	590.0	12.2
Eastern Slovakia (SK)	2 911 408	1 801.1	31.7
Zakarpattya (UA)	1 375 834	1 092.5	5.8
Ivano-Frankivsk (UA)	1 213 701	878.0	3.1
Lviv (UA)	3 202 628	1 262.9	15.4
Chernivtsi (UA)	272 406	299.4	2.3

Source: Eurostat (2017) and the State Statistics Service of Ukraine (2017), using the average annual number of inhabitants.

Table 4 provides regional data on the total number of overnight stays, both domestic and inbound. The tourism intensity rates in the Carpathian Euroregion are not very high. They are significantly below the average of the EU-28 (according to Eurostat data, 5 984 nights were spent by tourists in tourist accommodation establishments per thousand inhabitants in 2016).

The highest share of nights spent by non-residents was in Eastern Slovakia and Észak-Alföld. In contrast, the Ukrainian regions of Chernivtsi, Ivano-Frankivsk and Zakarpattya, and the Polish region of Podkarpackie, are visited mainly by residents. The political situation has influenced Ukraine's tourism. In 2014 there was a 48% decrease in foreign visitors to Ukraine as a whole (according to the State Statistics Service of Ukraine, the number of foreign citizens who visited Ukraine fell from 24.67 million in 2013 to 12.7 million in 2014 and 12.4 million in 2015). The trends in the number of nights spent within the period 2003-2015 shows that until 2010, Eastern Slovakia had the highest number of overnight stays per thousand inhabitants (with no data available for the Ukrainian regions).

Figure 1. Total overnight stays per thousand inhabitants 2003-2015

Source: Eurostat and State statistics service of Ukraine

For Slovak regions, fluctuation in the number of tourists and overnight stays is typical. In 2004 tourism in Slovakia's High Tatras was badly affected by a massive windstorm, which devastated almost one third of the local forests. In 2009, Eastern Slovakia and Romania Nord-Vest recorded the most notable drop in overnight stays (about 18%), which coincided with the most recent economic crisis. According to Kasagrandá (2015), in the case of Slovakia, another distinguishing factor might have been the introduction of the euro in 2009, which caused a fall in the number of tourists from surrounding countries, as Slovakia was perceived as an expensive country due to the higher exchange rates.

In 2011, Ukrainian Lviv had the highest number of overnight stays, but the political situation later caused a sharp decline. Thus, in 2014 Lviv was overtaken by Northern Hungary, which recorded the highest growth in overnight stays since 2011 (an average 14% annual growth). The Romanian regions and the two Ukrainian regions, possessing a relatively short border with Romania, have very low tourist attractiveness. The number of total overnight stays in Chernivtsi had declined even before the political

crisis in Ukraine. When considering the whole 13-year period, the number of nights spent per thousand inhabitants in Northern Hungary and Poland's Podkarpackie grew at approximately 5-6% per year on average, with the Eastern Slovakia regions falling about 2.6% at the same time. Figure 1 shows the magnitude of the disparities within tourism among different parts of the Carpathian Euroregion. These disparities have historically tended to decline; however, in recent years there has been an upward tendency. The standard deviation has decreased from 602 nights spent in 2003 to 392 nights in 2009. It then rose to 508 overnight stays in 2015 (with 525 nights in Ukraine's regions in 2015).

Data for the Ukrainian part of the Carpathian Euroregion is available only for 2011-2015. From this data, we can see regional disparities between four of Ukraine's regions in the number of overnight stays. The political situation in Ukraine had a varying impact on its regions. While Lviv and Chernivtsi experienced a decline, Zakarpattya and Ivano-Frankivsk saw a growing number of overnight stays in 2014. The number of tourists in 2014 declined in all regions except Ivano-Frankivsk. This decline was relatively low compared with the 35% decline of tourists in the whole of Ukraine. As we can see from Figure 2, in 2015 the situation stabilised in these four regions.

Figure 2. *Tourist arrivals at collective establishments in the Ukrainian part of the Carpathian Euroregion 2011-2015.*

Source: State Statistics Service of Ukraine.

A different situation may be seen in the number of overnight stays, which in 2015 rose only in Ivano-Frankivsk. Overnight stays declined significantly in Lviv (by 36% during the two years, which was still 10 % better than Ukraine's average). It should be pointed out that this decline was caused mainly by shortening of lengths of stay. While we cannot draw any firm conclusions about the impact of the Ukrainian political crises on Carpathian tourism from just two years' figures, the data does suggest an increase in the number of tourists (presumably mostly domestic tourists) in this area. The Russian annexation of Crimea, the top tourist destination in Ukraine, and the armed conflict in Donetsk and Luhansk, shifted the flow of tourists to the western part of Ukraine. This trend was confirmed by Riashchenko, Zivitere, and Kutryieva (2015). They reported that the annexation of Crimea had caused a massive change in Ukrainian tourist numbers, moving away from Crimea to destinations abroad or to the spa resorts of Zakarpattya. The currency depreciation caused by the political crises and visa

liberalisation may have had a positive effect on tourism in the more distant Ukrainian border regions. As Saayman and Saayman (2013) claim, the effect may be more pronounced on tourist spending than on tourist arrivals, although they were investigating South Africa, whose exchange rate volatility did not result from political instability.

Since data on total overnight stays are not available for Ukraine during the period 2005-2015, we used tourist arrivals at hotels and similar accommodation per thousand inhabitants to evaluate touristic attractiveness. Table 5 shows that during the period analysed, the total number of tourist arrivals at hotels and similar accommodation rose by 1.95 million. Average annual growth was 5.1%, and might have been even higher had there not been a financial and economic crisis, which caused a decline in the number of tourists in 2009.

Table 5. Total tourist arrivals in hotels and similar accommodation per 1000 inhabitants in the Carpathian Euroregion 2005-2015

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of tourist's arrivals per 1000 inhabitants	1895	2054	2209	2333	2028	2102	2352	2474	2668	2757	3126
% change on previous period	-	8.4%	7.5%	5.6%	-13.1%	3.6%	11.9%	5.2%	7.9%	3.3%	13.4%

Source: Eurostat (2017) and the State Statistics Service of Ukraine (2017).

Figure 3 reveals a pattern of the growth of tourist arrivals in hotels and similar accommodation within each part of the Carpathian Euroregion. In the next section, we will pursue a demand-side approach, using the number of tourist arrivals at hotels and similar accommodation per capita as a variable that could positively impact economic growth. As expected, the number of beds per capita has a very high coefficient of correlation with the number of tourist arrivals at hotels and similar accommodation per capita (0.927).

Modelling the economic growth of the Carpathian Euroregion

Table 6 shows the estimation results for the panel model of conditional beta-convergence with fixed effects. We have used only a fixed effect model because, according to Islam (2003), a random effect specification is unacceptable under the neoclassical growth framework. It implies that individual effects are correlated with some of the regressors. Also, the Hausman test provides evidence for the correlation between error terms and the regressors in the model ($\chi^2=28.87$, $p<0.001$). Thus, we rejected the null hypothesis and have used a fixed-effects model. A modified Wald test for groupwise heteroscedasticity shows the presence of heteroscedasticity ($\chi^2=395.06$, $p<0.001$). The Levin-Lin-Chu unit-root test rejected the null hypothesis that panels contain unit roots, not ruling out stationarity (Adjusted $t^*=-3.8448$, $p<0.001$). Pesaran's cross-sectional independence test showed that residuals are correlated across entities ($CD=10.647$, $p<0.001$). The Wooldridge test for autocorrelation in panel data also showed the presence of autocorrelation ($F(1,9)=12.909$, $p>0.05$). Therefore, as suggested by Hoechle (2007), we have used a fixed-effects regression model with Driscoll and Kraay (1998) standard errors, who proposed a nonparametric covariance matrix estimator which is heteroscedasticity and autocorrelation consistent, so standard errors are robust to very general forms of spatial and temporal dependence.

Figure 3. *The evolution of tourist arrivals in hotels and similar accommodation per 1000 inhabitants in Carpathian Euroregion by year (bars) within period 2005-2015.*

Source: Data from Eurostat and the State Statistics Service of Ukraine.

Note: For full data by year and region, see Table 8 in the appendix.

As can be seen from Table 6, all coefficients except lagged capital investment to GDP ratio are significantly different from zero. The results are consistent with the prediction of neoclassical growth theory, except the investment ratio, which is not statistically significant. A negative coefficient estimated for the logarithm of lagged GDP per capita $\ln(y_{i,t-1})$, which is also highly significant, confirms the hypothesis of conditional β -convergence for the Carpathian Euroregion. This result might also be influenced by the length of the investigation period and nominal instead of real GDP per capita, and economic cycle fluctuations.

The coefficient containing the effect of the population growth follows the prediction of the Solow model, as it is negative and statistically significant. As expected, the changes in exchange rates have a significant impact on GDP growth per capita. We can confirm that tourist arrivals per capita positively impact economic growth, as the corresponding regression coefficient is positive and statistically significant.

Table 6. Estimation results of panel data model with fixed-effects: regression with Driscoll-Kraay standard errors

Variables	Coefficient	Drisc/Kraay Std. Error	t	p> t	[95% conf. interval]	
const (β_0)	1.859764	0.382039	4.87	0.001	1.008529	2.710999
$\ln(y_{i,t-1})$	-0.234965	0.052176	-4.50	0.001	-0.351219	-0.118710
$\ln(n_{i,t-1} + g + \delta)$	-0.587477	0.22776	-2.58	0.027	-1.094958	-0.079996
$\ln(inv_{i,t-1})$	-0.013983	0.058234	-0.24	0.815	-0.143736	0.1157712
$arrivals - pc_{i,t}$	0.590048	0.196440	3.00	0.013	0.1523515	1.027745
$exr_{i,t}$	-0.817042	0.105892	-7.72	0.000	-1.052984	-0.581100

Notes: using 110 observations, included 10 cross-sectional units, time-series length: 11. In this model within R-squared=0.8828, $F(5,10)=410.70$, $p<0.001$)

Discussion and conclusions

In this paper, we have analysed tourism vis-à-vis regional disparities and growth within the Carpathian Euroregion. The constituent regions administratively belong to Slovakia, Poland, and Hungary, which entered the EU in 2004, Romania, which joined the EU in 2007, and Ukraine, which remains outside the European Union. While joining the EU removes many barriers, and there is an additional support mechanism in the form of the European Neighbourhood Instrument, many other factors affect cooperation within the region, e.g., political instability and drastic changes in market exchange rates. As all these diverse factors simultaneously influence the level of cooperation, this raises the question of what is the overall effect of cooperation within the region. We have tried to answer this question in a narrower sense, as we have focused on tourism within the Euroregion as one of the key aspects of cross-border cooperation.

Our objective in this paper was twofold. First, we have analysed regional disparities in touristic activities among different parts of the Carpathian Euroregion, finding significant heterogeneity. Second, acknowledging the differences within regions, we have explored the relationship between tourism and economic growth for the ten sub-regions, giving evidence for conditional convergence.

Our data shows that the changed political situation in Ukraine has had a substantial impact on the tourism sector, as it led to a 48% decrease in foreign visitors to Ukraine in 2014. However, not all of Ukraine's regions have been affected in the same way. Within the Ukrainian part of the Carpathian Euroregion, there was an increase in the number of tourists in 2015, mainly in the Ivano-Frankivsk region. On a similar note, one third of the National Park of the High Tatras, the best-known national park in Slovakia and a key tourist destination, was destroyed in a natural disaster in 2004. All regions were negatively affected by the global economic and financial crises of 2009-2010. Despite these dramatic events, both global and local, the Carpathian Euroregion's tourist attractiveness has increased over the period analysed.

To study the real impact on the cross-border economies, we have analysed the relationship between tourism and economic growth in the ten regions which make up the Carpathian Euroregion over the period 2005-2015. Using a panel data econometric model based on conditional β -convergence, we found evidence of the positive impact of tourism through total tourist arrivals at hotels and similar accommodation per capita on the growth of per capita income, speeding up the convergence rate.

By confirming the tourism-led growth hypothesis, our results are in line with the findings of Lee and Chang (2008), who used panel cointegration methodology to confirm Granger causality from tourism to economic growth in OECD countries. While in our case the results have been obtained using a panel data approach based on β -convergence, the evidence for the TLG hypothesis also supports the previous research of Balaguer and Cantavella-Jordá (2002) for Spain, Dritsakis (2004) for Greece and Dritsakis (2012) for Mediterranean countries. As the evidence presented suggests that ELT does not hold within the Carpathian Euroregion, our results contrast with studies such as Oh (2005) for Korea, Kim *et al.* (2006) for Taiwan and Katircioglu (2009) for Turkey.

Comparing our results with prior studies, several conclusions may be drawn. First, from the geographic perspective, the divergence among the papers in favour either of tourism-led growth or economic-led growth might suggest some clustering, as several of the papers which focus on the European Union or its constituent member states seem to favour TLD, supporting the evidence already presented by Romão (2020) and Ekonomou and Kallioras (2020). This raises the question of what role European integration, its support mechanisms and cross-border cooperation play in the causal direction between economic growth and tourism, which might be further explored in future research. Even though the results obtained in this paper support this hypothesis, a more comprehensive analysis beyond its present scope would be needed to verify whether its findings apply beyond one specific Euroregion.

The findings of this paper have policy implications not only for the regions analysed, but possibly also for other Euroregions founded on similar principles of cross-border cooperation. Since identifying the direction of the causal relationship between tourism and economic growth is essential for the formulation of viable strategies in both areas (Oh, 2005), regional confirmation of TLD may justify further support for tourism. Such support may be provided on the demand side and the supply side, either through stronger promotion of inter-regional and international tourism, or by supporting tourism-related infrastructure and cross-border cooperation among the members of the Euroregion. In times of economic downturn, such policies have the potential to act as sources of economic recovery (Dogru and Bulut, 2018).

The ongoing COVID-19 pandemic currently poses the most serious challenge to all forms of cross-border cooperation. For obvious reasons, this could not form part of our analysis: there is a significant delay between the publication of national statistics by statistical offices and the assembly of harmonised datasets at regional level. Even though the pandemic response has halted almost all non-essential travel, sometimes even preventing trips between districts in the same country, it is generally believed that these measures are temporary. Over the last century, Europe and its regions have seen world wars and natural disasters, as well as times of great prosperity and the lowering of physical and administrative barriers. This is the background on which cross-border cooperation was founded. Thus, future cooperation in the Carpathian Euroregion not only has much prior experience but also many economic, social and cultural incentives to build upon.

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Appendix

Table 7. Summary Statistics

Variable	Mean	Minimum	Maximum	Std. Dev.	Variance
$\ln\left(\frac{y_{i,t}}{y_{i,t-1}}\right)$	0.053896	-0.395951	0.311607	0.156690	0.024552
$\ln(y_{i,t-1})$	8.03638	6.297210	9.172095	0.797564	0.636108
$\ln(n_{i,t-1} + g + \delta)$	0.045833	-0.062369	0.059576	0.011722	0.000137
$\ln(inv_{i,t-1})$	-1.535488	-2.212641	-0.8612825	0.258861	0.067009
$arrivals_pc_{i,t}$	0.236353	0.047360	0.701480	0.141202	0.019938
$exr_{i,t}$	0.063161	-0.111293	0.541670	0.157262	0.024731

Table 8. Tourist arrivals in hotels and similar accommodation per 1000 inhabitants

Region	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Észak-Alföld (HU)	278	320	343	360	317	323	303	316	340	378	413
Észak-Magyarország	361	375	400	409	380	383	418	480	545	615	701
Podkarpackie (PL)	142	150	152	172	187	207	221	219	242	286	316
Nord-Est (RO)	164	179	193	198	180	173	195	167	163	174	200
Nord-Vest (RO)	263	282	324	337	273	268	307	270	280	303	349
Eastern Slovakia (SK)	409	427	456	478	385	414	420	444	478	432	487
Chernivtsi (UA)	56	66	71	82	60	56	98	111	130	114	113
Ivano-Frankivsk (UA)	52	49	49	48	47	58	130	169	158	165	180
Lviv (UA)	92	108	118	145	115	139	156	185	194	177	233
Zakarpatska (UA)	80	97	102	105	84	81	105	112	138	113	132

Source: Data from Eurostat and State statistics service of Ukraine.