DEVELOPMENT OF TOURIST TRAFFIC
IN THE REGIONS OF THE EUROPEAN UNION IN 2000–2015
– A SPATIAL AND TEMPORAL ANALYSIS

Marek Szajt, Ph.D., Associate Professor[1]

Marcin Zawada, Ph.D., Eng.[2]

Czestochowa University of Technology
Faculty of Management
Department of Econometrics and Statistics
Armii Krajowej 19 B, 42-200 Częstochowa, Poland
[1] *e-mail: marszajt@zim.pcz.pl*
[2] *e-mail: zawada@zim.pcz.pl*

Abstract

Tourism is a significant branch of the service sector in the economies of the European Union. The ever-growing role of tourism – as a result of wage increases and the prolongation of free time – is reflected in many studies. For selected countries and regions characterized by appropriate conditions for tourism development and often accompanied by the lack of other developed sectors of the economy, this is an alternative, for others it complements the service offering. In each case, this phenomenon is worth investigating. The aim of this article is to identify similarities and differences in the tourist development of individual regions of the European Union, taking into account selected factors determining these differences. The study uses a space-time model estimated using GRETL and Eviews. EUROSTAT data for 265 regions at NUTS2 level (without oversea French territories) for 2000–2015 were used based on availability for selected areas. In addition to the data on tourism intensity, the data on the wealth of the population and their demographic characteristics were taken into account. The results should be helpful in developing regional tourism development strategies.

Keywords: tourism, region, space-time model

JEL classification: Z3, P25, C21

Introduction

A constant increase in the number of people participating in global tourism results from the increase in the world population and concentration in specific regions, increase in the wealth of individual social groups, increasing level of education, proliferation of human life, progress of urbanization, desire to escape from degraded areas of natural environment, and many other factors (Czerwiński, 2006, p. 44). By adopting one of many definitions of tourism indicating that it is a "spatial phenomenon involving travels outside the place of permanent residence, in principle during holidays for recreational purposes, cognitive or certain hobbies, and the use and transformation of the geographic environment for the purpose of tourism" (Rogalewski, 1972, p. 10), the analysis of its changes in recent years in the European Union has been assumed. The aim of the study was to identify similarities and differences in tourism development of individual regions of the European Union taking into account selected (demographic) factors determining these differences.

1. Tourism in the economy

The phenomenon of tourism, due to its complexity, has been a subject of interest and research of many disciplines, including theoretical and practical sciences. As a social phenomenon tourism is included in the field of psychology, sociology, anthropology, history, and legal sciences, as a branch of the national economy – in the field of economic sciences.

While recreational tourism depends mainly on geographic conditions, active tourism can be additionally established (not only reinforced) through appropriate activities by local authorities and residents. Perhaps, this is the reason for the increase of the interest in active tourism, which makes many towns and even regions transformed into multifunctional centers capable of handling mass tourism, and at the same time offering varied forms of active leisure. As a result, the number of areas used for tourism is increasing and new tourist attractions that are unique compared to other regions, are being created. What is more, active tourism in this sense, in some way alleviates the influence of seasonality, which is a heavy burden especially for passive tourism.

Tourism can now be seen in five basic aspects (Kurek, 2007, p. 17):

– as a psychological phenomenon, referring to man – their needs, motives for a trip, represented values, purpose of travel, ideas, behaviors, and experiences,
– as a social phenomenon, in relation to interpersonal relations and interactions during a trip, social contact, relationships, social stereotypes, and effects on participants,

– as a spatial phenomenon due to the spatial character of migration (movement) of people (tourists), as well as the adaptation of space as a result of management and development of a tourist base to meet the needs of people involved in tourism,

– as an economic phenomenon in which the tourism market is entering into transactions between tourist service providers and their customers, resulting in specific economic effects for both parties and for the development of this market,

– as a cultural phenomenon, as it is an element of culture, and its expression (function of culture), tourism comes to encounter and influence cultures and their transformations. Virtually, all of these areas are connected with economics within the area of opportunities for gaining or shaping appropriate attitudes and behaviors that provide economic benefits in the future.

A direct measurable effect in terms of tourism development is a change in the number of tourists arriving to the area. In the case of the study of the European Union, these analyses are possible thanks to the data collected by Eurostat. The main indicators used today in this type of analysis are (Szromek, 2013, pp. 338–345):

– Charvat index, counted as the number of nights in relation to the number of inhabitants,
– Schneider's index, calculated as the number of tourists in terms of the population, and
– Baretje-Deferta index, calculated as the number of beds in relation to the number of inhabitants.

Similar indicators are calculated with the use of the study area as a reference variable. Charvat and Schneider's indicators investigate the intensity of tourist traffic, while Baretje-Defert's – accommodation density. In all of them, a tourist is taken as a person who has been staying in a given place for at least 24 hours, and / or their stay included accommodation.

Eurostat data from the years 2002–2014 were mainly used as a basis. The data covered 28 countries, with 265 regions (excluding 5 overseas for France) in NUTS 2 (for 2014). The analysis covered the number of tourists classified as residents (resident for at least 12 months) and non-residents, the number of nights spent in the examined area in the analyzed years, and the capacity of infrastructure – the size of accommodation base.

2. Analysis of tourism at the regional level

In the first place, the relations between the absorption capacity and efficiency of particular areas within the tourism sector were analyzed. For 145 regions, a statistically significant correlation was observed between the number of beds offered and the number of nights spent

between 2002 and 2014. For 28 regions, there was a statistically significant negative correlation between the number of beds offered and the number of nights spent (1 Czech and Spanish, 2 Romanian and Italian, 3 British, and 19 French regions) between 2002 and 2014. Thus, in the spatial perspective, we observe a statistically significant positive correlation between the number of beds offered and the number of nights spent (0.783–0.897).

By analyzing the number of nights, we take both resident and non-resident accommodations into consideration. The nature of the change is somewhat different. In the case of residents, we usually see an increase in their share of the overall tourist population when the level of prosperity of the population falls, and a decrease as the accessibility to foreign destinations (in economic terms) increases. Significantly, the barriers to the movement of tourists within the European Union have been largely eliminated. The question is whether the number of tourists in the countries surveyed has increased in recent years or not. In general, in the years 2000–2016, the only decrease in the number of tourists has been observed in Cyprus, reaching 12%. On average, in the EU countries, the number of tourists in the years 2000–2016 increased by 64%. The highest growth was observed in Lithuania – 397%, which is the result of, among others, an increase in the number of non-resident tourists by 415%. At the regional level, the highest increase was recorded (excluding Lithuania with no division for NUTS 2 in 2014) for the Yugoiztochen region – 383%. In Bulgaria, outside the Severoiztochen region (up by 45%), we are observing the growth of around 150%, and this is the highest increase in the number of tourists in the region. Compared to others, the following regions have outstanding results: Romanian Bucuresti - Ilfov (247%) and Prov. Hainaut (194%) from Belgium, German Berlin (168%) and Hamburg (193%), Greek Kentriki Makedonia (152%), Jadranska Hrvatska (151%) and Kontinentalna Hrvatska (174%), and Latvia (198%). The largest outflow of tourists at the regional level was recorded in the British Lancashire (a decrease by 49%), North Eastern Scotland (74% down), and Cornwall and Isles of Scilly (a decrease by 45%). In the 37 regions with a decrease in the number of tourists, 10 are British, 6 Italian, 6 German, and 6 (out of 8) Czech. Most of the decline is due to the decrease in the number of domestic tourists. Merseyside in the United Kingdom experienced an increase in the number of foreign tourists by 514%, followed by West Yorkshire by 188%, South Yorkshire by 237%, and East Wales by 133%. Only in the three UK regions, a decline has been observed in the number of non-resident tourists. In addition to the aforementioned Lithuania, the high increase in the number of non-resident tourists in the years 2000–2016 was also reported by Latvia (337%), Kontinentalna Hrvatska (326%), Romanian Yugoiztochen (401%), and Berlin (347%). The largest decreases were

recorded for Strední Cechy by 57%, Italian Molise by 44%, Hungarian Közép-Dunántúl by 46% and Dél-Dunántúl by 60%, and Romanian Sud Est by 31%.

Despite these changes, a number of countries have witnessed the convergence of the number of tourists in the region. For obvious reasons, only the countries with the appropriate regional distribution could be analyzed.

Table 1. Evaluating the convergence coefficient β for selected EU countries
for the number of non-resident and resident tourists (regional)

Country	Residents		Non-residents		Total	
	β (%)	p	β (%)	p	β (%)	p
Belgium	3.0*	**0.000**	2.1*	**0.015**	2.4*	**0.001**
Bulgaria	0.7	0.764	0.8	0.466	1.1	0.500
Czech Rep.	4.5*	**0.013**	−1.0	0.489	−3.2	0.178
Denmark	1.0	0.171	−1.2	0.282	0.8	0.448
Germany	1.3*	**0.026**	0.6	0.254	1.2*	**0.049**
Greece	−1.6	0.067	0.1	0.836	−0.2	0.715
Spain	2.6*	**0.002**	1.1*	**0.000**	1.4*	**0.000**
France	0.3	0.450	−0.1	0.907	0.2	0.621
Italy	1.3*	**0.035**	−0.1	0.790	0.7	0.134
Hungary	−0.9	0.367	1.6	0.410	1.8	0.107
Netherlands	0.5	0.070	−1.4*	0.004	−0.3	0.393
Austria	0.7	0.210	0.0	0.994	0.3	0.492
Poland	1.9*	**0.013**	−1.0	0.222	1.3*	**0.056**
Portugal	0.8	0.721	1.4	0.146	1.0	0.203
Romania	4.0*	**0.034**	−0.2	0.887	3.4	0.189
Slovakia	6.1	0.367	−2.0	0.764	3.3	0.697
Finland	2.8	0.192	1.5	0.324	2.0	0.175
Sweden	0.9	0.458	−1.4	0.123	0.0	0.998
United Kingdom	2.0*	**0.001**	1.9*	0.050	2.8*	**0.000**

* Significant at the $\alpha = 0.05$ level.

Source: authors' own elaboration on the basis of Eurostat database.

In general, in Belgium, Germany, Spain, Poland, and the United Kingdom, we observe regional convergence in the area of the number of tourists. Importantly, four of these countries are among the six largest EU member states. The countries with the greatest share of tourism in the economy – Greece, Italy, and France – operate in this area primarily using resources (attractiveness) of the flagship regions. Interestingly, the convergence of tourist arrivals in Poland and Germany leads to the convergence in tourism in general. However, there are no country in which the convergence for non-residents only cause general convergence.

In the next stage, the correlation between the demographic variables and the number of overnight stays was examined.

Table 2. Correlation between demographic variables and the number of nights

Demographic variables	Direction of correlation	nights spent by residents	nights spent by residents/ per capita
Median age of population	+	148 (55%)	138 (52%)
	–	33	40
population aged 0–19 to population 20–59 years	+	33	34
	–	119 (44%)	113 (43%)
population 65 and over to population 15 to 64 years	+	132 (49%)	129 (49%)
	–	23	26
population 60 and over to population 20 to 59 years	+	134 (50%)	129 (49%)
	–	26	41

Source: authors' own elaboration on the basis of Eurostat database.

The correlation analysis has shown that in most cases, if the correlation between demographic variables and the number of nights is significant, it is positive. This does not mean that the increase in the age (average) of the inhabitants results in the development of tourism, but that prolonging the lives of population, by increasing the potential number of tourists, improves tourism development indicators.

3. An attempt at modeling regional tourism

Next, a group of econometric models was proposed by the authors. Their construction was based on the basis of regional ideas proposed in similar analyzes in relation to innovativeness:

$$\Delta \log NCL,,X"_{it} = \alpha^{*}_{i1} + (\alpha_1-1)(\log NCL,,X"_{it-1} - \delta_1\log MN_{it-1} - \delta_2\log OH_{it-1} - \delta_3\log GDP_{it-1} - \delta_4\log ZD_{it-1}) + \beta_1\Delta\log MN_{it} + \beta_2\Delta\log OH_{it} + \beta_3\Delta\log GDP_{it} + \beta_4\Delta\log ZD_{it} + \varepsilon_{it},$$

where:

NCL_{it} – the number of overnight stays (residents "X = R", non-residents "X = N"), calculated per the number of inhabitants in the given period t for the *i*-th region;

MN_{it} – the number of beds per inhabitant for *i*-th region in period *t*;

OH_{it} – the number of hotels per inhabitant in a given period *t* for *i*-th region;

GDP_{it} – gross domestic product (according to purchasing power parity at constant prices from 2010) per thousand inhabitants for *i*-th region in period *t*;

ZD_{it} – demographic variable designated for *i*-th region in period *t*.

These models differed in terms of various demographic variables while other variables were in the same (as assumed) state. The models used an error correction construction (Szajt,

2009), and an estimate was made for a balanced space-time trial for residents and, separately, for non-residents. A number of diagnostic tests were conducted in the preliminary stage (Dańska-Borsiak, 2011).

Table 3. The results of IPS unit root tests for used variables

Variable	Integration order ~I(0)		Integration order ~I(1)	
	statistic	p-value	statistic	p-value
NCLR	−1.652	0.049	−21.070	0.000
NCLN	2.507	0.994	−21.660	0.000
GDP	4.465	1.000	−20.830	0.000
OH	3.227	0.999	−17.195	0.000
MN	2.008	0.978	−22.950	0.000
MEDIAN	18.703	1.000	−9.326	0.000
19/20-59	−7.290	0.000	−6.247	0.000
60/20-59	21.121	1.000	−4.948	0.000

Source: authors' own calculations in EVIEWS.

All the variables turned out to be integrated in order of I (19/20-59 demographic variable was stationary). The cointegrating vector (Pedroni, 1995) was then examined for the analysed images:

Table 4. The results of the cointegration test for Pedroni residuals in the models

Test type	Model for residents		Model for non-residents	
	statistic	p-value	statistic	p-value
Panel PP-Statistic	−16.442	0.000	−16.044	0.000
Panel ADF-Statistic	−11.376	0.000	−11.459	0.000
Group PP-Statistic	−29.171	0.000	−24.731	0.000
Group ADF-Statistic	−8.289	0.000	−6.214	0.000

Source: authors' own calculations in EVIEWS.

The variables used in the model were found to be integrated so the estimation was made using the most reliable method (Majsterek, 2014).

The model for non-residents pointed to the significant short-term positive elasticity of the number of overnight stays relative to the number of beds (in all perspectives) of hotel facilities for models II and III, and selectively GDP and demographic variables. The long-term positive elasticity applied only to GDP and model II number of beds. The evaluation of parameters standing at demographic variables (long-term) indicate the effect of a prolonged life – increasing the number of years of life and hence the potential demand – on the increase in the number of overnight stays. However, it is interesting to use the data for non-residents in such a model, as

we are dealing here with the impact of life expectancy on the number of visitors. The model for residents is much better and more substantive.

Table 5. The values of structural parameter assessments
in the tourist traffic of non-residents model

Variable	Parameter	Model I	Model II	Model III
Const	α_0	0.659	1.108	0.417
NCLN$_{-1}$	α_1	0.995	0.990	0.998
MN$_{-1}$	δ_1	–	0.619	−1.862
OH$_{-1}$	δ_2	−0.440	–	–
GDP$_{-1}$	δ_3	3.834	1.916	6.426
60/20-59$_{-1}$		12.231	×	×
19/20-59$_{-1}$	δ_4	×	−7.589	0.000
MEDIAN$_{-1}$		×	×	84.774
ΔMN	β_1	0.126	0.529	0.534
ΔOH	β_2	–	0.122	0.122
ΔGDP	β_3	0.571	–	–
Δ60/20-59		0.247	×	×
Δ19/20-59	β_4	×	–	×
ΔMEDIAN		×	×	1.635

Source: authors' own calculations in GRETL.

Table 6. The values of structural parameter assessments in the tourist traffic of residents model

Variable	Parameter	Model I	Model II	Model III
Constans	α_0	0.885	0.953	0.771
NCLR$_{-1}$	α_1	0.965	0.965	0.963
MN$_{-1}$	δ_1	0.567	0.572	0.541
OH$_{-1}$	δ_2	–	–	–
GDP$_{-1}$	δ_3	0.283	0.286	0.541
60/20-59$_{-1}$		0.567	×	×
19/20-59$_{-1}$	$\tilde{\delta}_4$	×	–	×
MEDIAN$_{-1}$		×	×	1.351
ΔMN	β_1	0.110	0.120	0.110
ΔOH	β_2	−0.012	–	−0.012
ΔGDP	β_3	0.350	0.350	0.340
Δ60/20-59		0.370	×	×
Δ19/20-59	β_4	×	0.210	×
ΔMEDIAN		×	×	0.770

Source: authors' own calculations in GRETL.

In the models for residents, the number of beds and wealth measured by GDP have shown a significant and positive impact on the number of overnight stays in both the short and the long

term. The number of hotel facilities turned out to be important only in the short term, and the indicated flexibility is negative. Taking into account the interpretation assuming the stability of other factors, the reason may be the difficulty of making decisions by consumers. Similar to previous models of demographic variables, both long-term and short-term indicators indicate the impact of increasing the length of life – the increasing number of years of life and hence the potential demand – on the increase in the number of overnight stays. Different interpretations should refer to the demographic variable in model II, but this is only a short-term elasticity, hence its interpretation does not change the general view.

The model uses decomposition of the free term in space, which gives information about strengthening (at its positive value) or reducing the effect of the influence of the explanatory variables used on the explanatory (multiplicative).

Table 7. Percentage of regions with a negative intercept

Country	Percentage	Country	Percentage
Ireland	0	Greece	64
Sweden	0	Bulgaria	67
Germany	14	Portugal	75
Denmark	18	Romania	75
Italy	21	Slovakia	75
United Kingdom	23	Belgium	82
Spain	24	Luxembourg	100
France	30	Lithuania	100
Netherland	33	Latvia	100
Austria	50	Estonia	100
Finland	50	Cyprus	100
Hungary	57	Malta	100
Poland	62	Croatia	100
Czech Republic	63	Slovenia	–

Source: authors' own calculations.

The diversification in response by regional economies to the changes in tourism-related variables is significant. Most of the regions of the most developed countries – Spain, Italy, and France – benefit from positive changes, which is not true with regard to the majority of the newly adopted countries. In the group of the countries that are benefiting to a lesser extent from the growth of determinants of tourism are poorer Greece and Portugal, and also Belgium and Luxembourg. Luxembourg is an unusual country due to its size, but, in Belgium, the results are puzzling.

Conclusions

The results of the analyses obtained in the course of the study allow us to indicate the following conclusions:

– tourist traffic in different regions is developing in a very different way. We observe changes from decreases in the scale of –7.4% to increases of 13.6% annually. The decreases concern 50 regions,

– the number of beds is not only a response to the existing demand, but it also shapes this demand – generally increases,

– the convergence in the area of tourism development at a regional level can be observed, especially when it concerns the internal market (residents),

– the studies indicate a positive effect of longevity on the development of tourism,

– in the present internal conditions, there are regions clearly much more effective in attracting the customers of tourist services than others.

The conclusions presented could be used to construct regional development strategies in the field of tourism.

References

Czerwiński, J. (2006). *Turystyka. Wybrane zagadnienia*. Wałbrzych: PWSZ.

Dańska-Borsiak, B. (2011). *Dynamiczne modele panelowe w badaniach ekonomicznych*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

http://ec.europa.eu (30.10.2017).

Kurek, W. (red.) (2007). *Turystyka.* Warszawa: Wydawnictwo Naukowe PWN.

Majsterek, M. (2014). Modelowanie systemów skointegrowanych. Aspekty teoretyczne. *Bank i Kredyt*, *45* (5), 433–466.

Pedroni, P. (1995). Panel Cointegration, Asymptotic and Finite Sample Properties of Pooled Time Series Tests, with an Application to the PPP Hypothesis. *Econometric Theory*, *20*, 2004, 597–625. DOI: 10.1017/S0266466604203073.

Rogalewski, O. (1972). *Podstawy gospodarki przestrzennej w turystyce*. Warszawa: Szkoła Główna Planowania i Statystyki.

Szajt, M. (2010). *Działalność badawczo-rozwojowa w kształtowaniu aktywności innowacyjnej w Unii Europejskiej*. Częstochowa: Wydawnictwo Politechniki Częstochowskiej.

Szajt, M. (2009). Estimation of Disproportions in Patent Activity of OECD Countries Using Spatio-Temporal Methods. *Dynamic Econometric Models*, *9*, 91–98.

Szromek, A.R. (2013). Wskaźniki funkcji turystycznej i ich współzależność z innymi wskaźnikami ekonomicznymi na przykładzie polskiej gospodarki w latach 2000–2010, *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, *304*, 338–345.