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Conference Paper

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52nd Congress of the European Regional Science Association: "Regions in Motion - Breaking the Path", 21-25 August 2012, Bratislava, Slovakia

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Linderhof, Vincent; Reinhard, Stijn (2012) : Do rural development program measures for the encouragement of rural tourism work? A spatial econometric analysis, 52nd Congress of the European Regional Science Association: "Regions in Motion - Breaking the Path", 21-25 August 2012, Bratislava, Slovakia, European Regional Science Association (ERSA), Louvain-la-Neuve

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Do rural development program measures for the encouragement of rural tourism work? A spatial econometric analysis

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Abstract

This paper analyses the impact of Rural Development Program (RDP) measures focussing on tourism have on the growth of tourism and on the economy in rural areas. We first explored tourism in NUT2 regions in the EU with a spatial data analyses and then we applied spatial econometric analyses on tourism where we take into account the RDP spending on the measures that encourage tourism. For the spatial regression analyses, we use the indicators of the CMEF framework. The data were collected from Eurostat. The spending on the RDP measure 313 *encouragement of tourism* is not uniformly distributed over the NUTS 2 regions in the EU. The spatial analyses of tourism measured by the number of nights spent by non-residents showed the presence of spatial dependencies in tourism. Based on the spatial dependency tests of the classical regression model, a spatial error model is estimated. The number of bed places positively affected the total number of night spent by non-residents. RDP spending on encouraging tourism did not have a significant impact on tourism.

JEL codes: C21, L83, O18

Keywords: Rural Development Program, spatial data analyses, spatial econometrics, tourism

1 Introduction

The objective of the Rural Development Programs (RDP) of the EU is to stimulate the economy in rural areas. Axis 3 of the RDP focuses attention on measures that stimulate non-agricultural activities such as tourism. In particular, measure 313 of the RDP 2007-2013 aims at encouraging tourism in rural areas, see Table 1, where the population in rural areas is eligible for application. In addition, measure 311 focuses on the diversification into non-agricultural income by farmers. One of the non-agricultural activities supported is tourism such as bed and breakfast services for instance.

Table 1 The description of the measures 311 and 313

Aspect	Measure 311	Measure 313
Description	Diversification into non-agricultural activities (Article 52 (a) (i) of Reg. (EC) N° 1698/2005)	Encouragement of tourism activities (Article 52 (a) (iii) of Reg. (EC) N° 1698/2005)
Rationale of the measure	The measures under Axis 3 should contribute to the overarching priority of the creation of employment opportunities in rural areas in non-agricultural activities and services. The objective of diversification is also to maintain or increase the income of the farm households.	In order to reverse the negative trends of economic and social decline and depopulation, seen in many parts of the European countryside, support should be provided for the encouragement of tourism activities. Tourism is a major growth sector in many rural areas and thereby creates new employment opportunities and increases the overall attractiveness of the rural area.
Content of the measure	The measure foresees support to members of a farm household who diversify in non-agricultural activities. There are different categories of non-agricultural activities that can be supported such as: - service activities: e.g. bed and breakfast, education and social activities on farm.	The support under this measure shall cover: - small scale infrastructure as information centres and sign posting of tourist sites - recreational infrastructure such as that offering access to natural areas, and small capacity accommodation - the development and/or marketing of tourism services relating to rural tourism
Target group	A member of the farm household	Population in rural areas

Source: (EC, 2006)

From Axis 3, we decided to begin our analysis with measure “diversification into non-agricultural activities” (311). The origin of the measures in Axis 3 is further removed from the agricultural sector than the measures in Axis 1 and Axis 2, and as a result they can be described as the only true rural (rather than agricultural) development measures of the RD catalogue (Agra, 2005). The content and the grants are similar to measure 121 with the difference that measure 311 focuses on non-agricultural investments, while 121 has a pure agricultural focus. Both measures were handled together in the programming period 2000-2006, and a separation of the evaluation results only for non-agricultural investments is factually not possible (Uthes *et al.*, 2011).

Table 2 Axis 3 EU spend on measures 311 and 313.

Measure		2000-2006		2007-2013	
		€ mln	%	€ mln	%
311	Diversification of agricultural activities (Art 33)	645	12.2	1,301	8.6
313	Encouragement for tourist and craft activities (Art 33, 2000-06) / tourism activities (2007-)	433	8.2	1,165	7.7
Total Axis 3		5,273	100	15,066	100

Note: Data for Germany, Spain, UK, Italy, Portugal and Malta were not yet included in the period 2007-2013.

Source: (Dwyer *et al.*, 2008)

The spending on measures 311 and 313 is increasing over the last years. In 2007, about €12 million was spent on measure 311 and it increased to almost €200 million in 2010. For measure 313, we observed a similar pattern; €6 million in 2007 and €157 million in 2010. The spending on either measure 311 or 313 also show a huge difference across EU Member States. The maps in Figure 1 and Figure 2 show the spending on measure 311 and 313 at NUTS2 level in 2010.

Both maps show that the spending on measure 311 and 313 is not uniformly distributed over Europe. The spending on 311 were observed in the middle, northern western and northern Europe. Member States such as Romania and Hungary do not spend on 311, but do spend on measure 313, while in Poland it is the other way around. In Portugal, Spain, southern Italy and Greece, there is hardly any spending on either measures. In all these countries the tourism sector is a substantial economic sector.

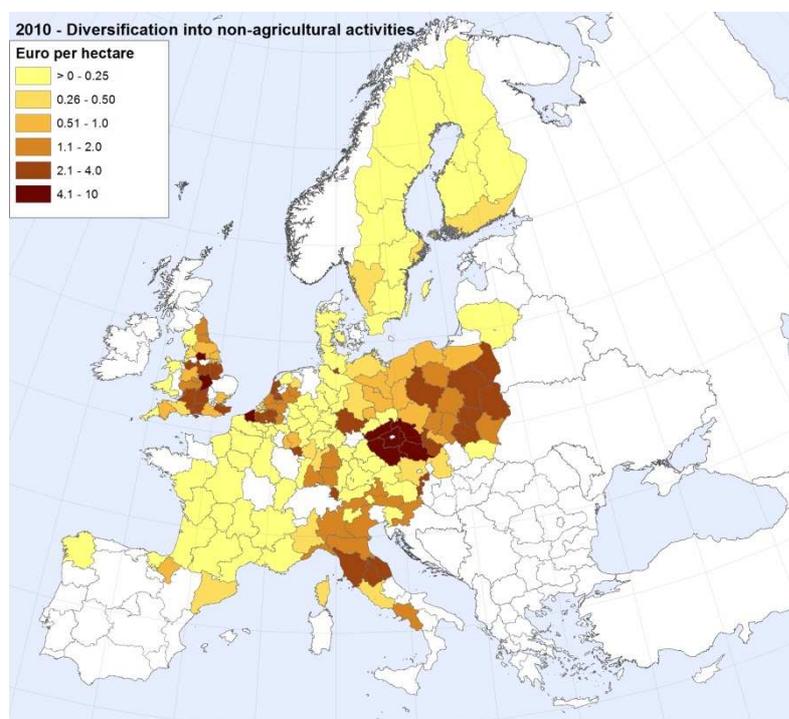


Figure 1: Spending per hectare on measure 311 per NUTS 2 region in 2010

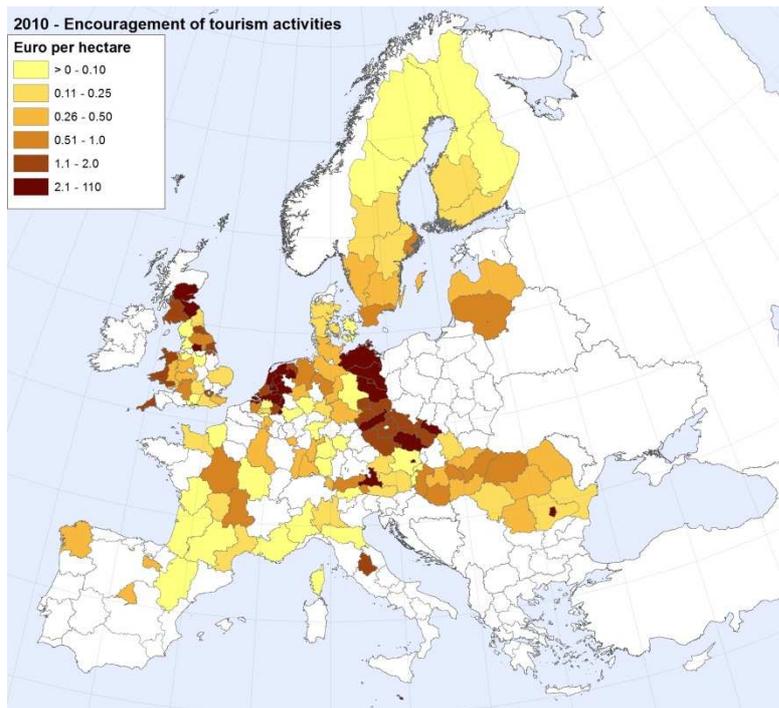


Figure 2: Spending per hectare on measure 313 per NUTS 2 region in 2010

For the assessment of RDP measures, the European Commission in consultation with the EU Member States has introduced an assessment framework the so-called Common Monitoring and Evaluation Framework (CMEF). The CMEF distinguishes different parameters for monitoring the implementing of measures within the RDP. For each measure, CMEF prescribes the following levels of indicators:

- the baseline indicators for (objective- and context-related);
- input indicators (expenditures);
- output (physical);
- result (physical and successful) and
- impact.

Baseline indicators describe the socio-economic, environmental and land use situation of a region, while the other indicators are related to budget, implementation and impact of rural development measures. Figure 3 shows the relationship between the different levels of indicators. Note that both measures have different objectives and this different indicators. One of the triggering questions is whether the encouragement of tourism will have spill-over effects to other economic sectors or to tourism in other regions.

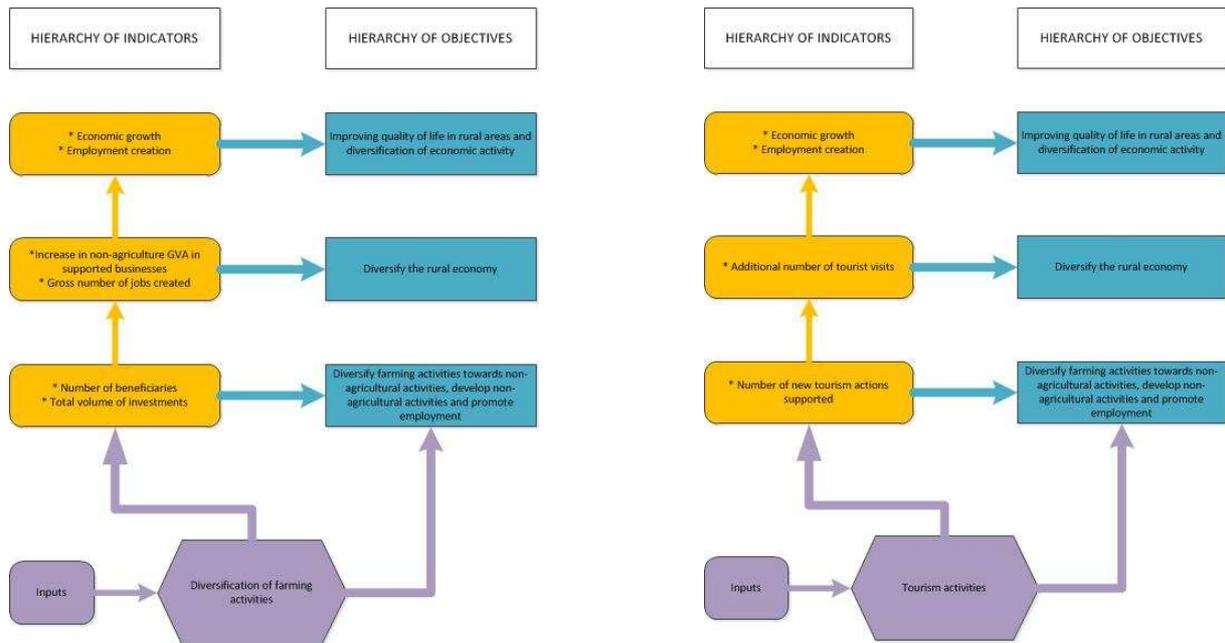


Figure 3: Objectives and indicators for measure 311 (left) and 313 (right)

This paper analyses the impact of RDP measures encouraging tourism have on the growth of tourism and on the economy. We will first explore tourism with a spatial data analyses and then we will apply spatial econometric analyses on tourism where we take into account the RDP spending on the measures that encourage tourism. For the spatial regression analyses, we use the indicators of the CMEF framework. We apply our analyses to tourism data at NUTS2 level. The data are collected from Eurostat.

The outline of this paper is as follows. Section 2 discusses the model and econometric specification of the tourism analysis. Then Section 3 defines the indicators and presents the data used for the spatial econometric analysis. In Section 4, the estimation procedure and results are presented. Finally, Section 5 discusses the results and the conclusions from using spatial econometric analysis for explaining the impact of measure 313 on development of tourism.

2 Theory and model

The rationale of measures 311 and 313 is the increase of economic growth of a rural area by encouraging rural tourism in the EU regions. In fact, measure 311 supports farmers that would like to start tourism activities next to their agricultural activities, and measure 313 urges the increase of tourist demand in a region for a wide range of applicants. In the economic literature, there is published a wide range of articles on tourism and its impact on the economy. Tourism can be helpful in improving the multi-functionality of the a region which implies more robust economic development, see (van Leeuwen *et al.*, 2009). In addition, stimulating tourism in a region also implies an increase in employment, because tourism is a

rather labour-intensive sector but it does not require highly skilled labour, see (van Leeuwen *et al.*, 2009).

In the literature, tourism has been analysed from many different perspectives: production efficiency, tourist demand analyses, impact of tourism on the economy. The production efficiency perspective relates to the efficient use of tourism accommodations. (Bernini and Guizzardi, 2010) for instance analyse hotel efficiency in Italy in order to identify the causes of the low hotel efficiency growth compared to France and Spain. This type of analyses is beyond the scope of SPARD. Therefore, we focus attention on tourist demand analyses and economic growth theory analyses, since both can be related to the evaluation of RPD measures to stimulate rural tourism.

The literature on the impact of tourism on the economy can be divided into two streams of literature. First, the importance of tourism on the (local, regional or national) economy are measured with input-output or multiplier analyses. Van Leeuwen *et al.* (2009) summarizes a number of studies that deal with the analyses of the relevance of tourism on the regional economy from a static perspective. Most studies used input-output type of analyses in order to derive multiplier impacts on the economy due to changes in tourism. In addition to the studies with input-output and multiplier analyses, (Dwyer *et al.*, 2004) explores a computable general equilibrium model for analysing the drivers of tourism. Studies using CGE models can be useful for ex-ante evaluation of tourism, but they do not provide evidence for drivers to affect tourism.

Next to the input-output related analyses, there is also a stream of articles on the analyses of tourist demand and the role of tourism in the so-called growth-led economy. In growth-led economy, tourism is one of the key drivers of economic growth. The role of tourism in the economy is analysed with models based on the economic growth theory using time series or panel data analyses. (Brau *et al.*, 2004, Brau, 2007 #665) found that tourism-based economies have higher economic growth rates than non-tourism based economies. (Payne and Mervar, 2010) found evidence for positive unidirectional causality from real GDP to international tourism revenues, which supports the economic-driven tourism growth hypothesis. The findings of (Nissan *et al.*, 2011) indicate that tourism stimulates the local firms' productivity and creates new job opportunities that increase the country's welfare. Additionally, entrepreneurship and prices have impacts on tourism.

(Goel and Budak, 2010) analysed more specifically different aspects of tourism on economic growth, and they found that strengthened tourism safety regulations and government prioritization of the tourism industry boost economic growth, while tourism initiatives and infrastructure investments seem to have perverse growth effects. If the impacts of all aspects are summed up, economic growth is higher in transition nations (Goel and Budak, 2010).

Based on a 150 countries comparison, (Figini and Vici, 2010) provide empirical evidence that tourism-based economies did not grow at a higher rate than non-tourism-based countries since the 1990s. They note that their data on international tourism in the period 1980-2005 were not fully reliable.

Tourism demand is often analysed with a temporal perspective, see (Morley, 2009). The specification of a tourism demand model now commonly includes lagged demand as an explanatory variable. This raises issues in the formulation and interpretation of econometric tourism demand models. (Morley, 2009) argued that a simple lagged demand term is not sufficient to account for the dynamics of tourism demand. The dynamics of tourism demand have spatial aspect as well, see the previous section.

(Marrocu and Paci, 2011) examine tourism flows as determinants of regional total factor productivity within a spatial framework. Within their analysis of 199 European regions, they controlled for intangible factors, such as human, social and technological capital, and for the degree of accessibility. Their empirical results showed that tourism flows enhance regional efficiency and intangible assets, infrastructures and spatial spill-overs have positive impacts on regional economic growth.

For the assessment of the impact of RDP measures 311 and 313, Nissan et al. have provided a suitable two equation model:

$$GDP = f(PE, I, TOUR) + \varepsilon \quad (5.1)$$

$$TOUR = h(TEA, GDP, MS) + \nu \quad (5.2)$$

Regional gross domestic product (*GDP*) is explained by public expenditures (*PE*), the private investment (*I*), the human capital (*KHU*) and an indicator for tourism (*TOUR*). Tourism is endogenous itself, and is explained by total entrepreneurship activity (*TEA*), *GDP* and the money supply (*MS*). Nissan et al. use panel data for the estimation of both equations. They do not take into account spatial dependencies.

There are two reasons to take into account spatial dependencies when analysing tourist demand. The maps on tourism in the previous section showed that the spending on both measures is not uniformly distributed over the NUTS2 regions. Also, spatial data analysis of tourism indicators did show significant spatial dependencies. Ignoring the spatial dependencies might lead to biased estimators. Therefore, we start simple with the exploration of a tourism model in Eq. (5.2) in order to be able to take into account the spatial dependencies in a proper way.

In addition to the tourism model of Nissan et al. (2011), we have scanned the literature for additional relevant explanatory variables. As a result, we specify the demand for tourism as follows:

$$TOUR = h(Cap, GDP, Unempl, NatEnv, Acc, Cli) + v \quad (5.3)$$

where

Cap = capacity of tourist accommodations

GDP = gross domestic product per capita

Unempl =unemployment rate

NatEnv = natural environment variables

Acc =Accessibility variables like presence of infrastructure

Cli = Climate variables (precipitation, temperature etc.).

In addition, the spending on RDP measures will be included as well. The capacity is the number of bed places per region which are available the whole year. The *NatEnv* variables are variables like the presence of forest or other natural areas. *Acc* variables include the infrastructure of a region including roads network, presence of harbours and airports for instance. *Cli* variables are the climatic variables, such as precipitation, number of sunny days and temperature. Below, we take into account indicators of the different characteristics in Eq. (5.3) which are readily available from Eurostat and other public sources.

3 Data and definitions

The econometric specification in the previous section is estimated with data at the level of NUTS2 regions. In terms of CMEF, we prefer to use impact indicators. However, the impact indicators for measure 313 are still rather broad (economic growth and employment creation), and it would be very hard to disentangle the impact of one particular measure. Instead, we select one of the CMEF result indicator which is the increase in the number of visitors. Preferably, there is a distinction between visitors staying overnight and daily visitors.

The tourist data from Eurostat includes information on nights spent by tourists, and not on daily visitors. Eurostat distinguishes four types of tourist namely:

- 1) The number of nights spent in tourist collective tourist accommodation establishments.
- 2) The number of nights spent in tourist hotels and similar accommodation establishments.
- 3) The number of nights spent in tourist collective tourist accommodation establishments by non-residents.
- 4) The number of nights spent in tourist hotels and similar accommodation establishments by non-residents.

According to the definition of Eurostat, a collective tourist accommodation establishment is an accommodation establishment providing overnight lodging for the traveller in a room or some other unit, with the number of places provided greater than a specified minimum for

groups of persons exceeding a single family unit. In addition, all the places in the establishment must come under a common commercial-type management, even if the establishment is non-profit-making.

The collective tourist accommodation establishments include: hotels and similar establishments; other collective accommodation establishments such as holiday dwellings, tourist campsites, marinas; and specialised establishments such as health establishments, work and holiday camps, public means of transport and conference centres. For more details on the definition of the different accommodations, we refer to the Eurostat website.

For our analyses, we use the nights spent in tourist collective accommodation establishments in the years 2001 and 2009. The emphasis of our analyses is on the spatial correlation of the dependent variables and we try to explain the growth in night spent in the period 2000-2009. Eurostat presents the data at NUTS2 level, but the indicators are not available for all NUTS2 areas. Therefore, we constructed a sample of NUTS2 areas based on the following criteria:

- Availability of tourist data at NUTS2 level, which means that NUTS2 areas in Ireland, Inner London, Outer London are excluded, because data are lacking.
- Overseas areas of France, Portugal, Spain and the Netherlands are excluded, see the paragraph on the weight matrix.
- European Islands are excluded as well for convenience. For many Islands, tourism is an important economic activity, but we have to exclude them in order to be able to explore spatial econometric analyses.

When we take a look at the tourist data at NUTS2 level, the information is not always available for the years 2001 and 2009. In the case that information is missing, we first used proxies by imputing data for the areas from other years (2000 and 2002). In this way, we do not have to exclude all the NUTS2 areas without data on tourism for the year 2009. Our final sample included 251 NUTS2 areas.

Variables

From the literature on the economics of tourism we can derive a number of explanatory variables of the growth of tourism, such as tourism capacity, attractiveness of the area, the level of wealth of the area and the spending on RDP measures and measure 313 in particular. The capacity of tourism is measured as the number of bed places in accommodation establishments in an area. In fact, spending on measure 313 partly affects the capacity of tourism. The attractiveness of an area is measured by several variables, such as presence of beaches or the presence of natural areas, since tourists are primarily interested in rural tourism. Accessibility can be measured by the number of airports or the size of airports but these variables are not yet available. For the time being, accessibility is taken into account through the country dummies.

Ideally, the origin of the tourist could be of relevance to estimate the demand for tourism, however there are no data available – at least not to our knowledge – on the origin of tourists at the EU27 level. Finally, we include country dummies which absorb different types of effects which are not captured by the other variables. The country dummies include, for instance, climatic effects: the southern EU Member States have higher levels of tourists than northern EU Member States due to better weather conditions throughout the year. In addition, accessibility is captured by country dummies as well.

Weight matrix

In the case of tourism, one might argue that direct connections are not a good indicator for spatial dependency. Large tourist flows do not have their origin from neighbouring countries. For example, the most favourite countries for holidays abroad of the Dutch population are France and Germany. The Netherlands does have a direct connection to Germany but not to France. For convenience, however, we choose a contiguity matrix because it uses simple connections and is easily calculated. In a later stage, we might explore and test the use of other types of weight matrices.

Table 3 Top 4 countries for holiday abroad of the Dutch population in 2001 and 2009

Position	2001		2009	
	Country	Share (%)	Country	Share (%)
1	France	19.6	Germany	19.1
2	Germany	12.5	France	15.3
3	Spain	11.3	Belgium	10.8
4	Belgium	10.9	Spain	8.4

Source: Statistics Netherlands.

4 Results

The results in this section are still preliminary. Additional analyses to check for the robustness of our results will be further explored. Unfortunately, not all relevant variables are not yet available at NUTS2 regions.

Explanatory data analysis

We explore the spatial dependency in the indicators of tourism. Table 4 shows the Moran's I statistics for the different definitions of tourism. It distinguishes the absolute number of nights spent in 2001, the absolute number of nights spent in 2009, and the growth rate in the number of nights spent in the period 2001-2009.

Table 4 Moran's I for Estimation results for growth rate of nights spent at NUTS2 level

Definition of tourism*	Absolute number of nights spent			Growth rate of nights spent		Tourism intensity
	2001	2007	2009	2001-2009	2001-2007	2009
All accommodations, all tourist	0.3256	0.2885	0.3079	0.0676	0.2771	0.1567
Selection of accommodations, all tourist	0.2735	0.2280	0.2422	0.3780	0.3750	0.0611
All accommodations by non-residents	0.2577	0.2408	0.2580	0.2422	0.2816	0.1992
Selection of accommodations by non-residents	0.2110	0.1908	0.2408	0.2946	0.3193	0.2985

* The selection corresponds to the definition of tourism in Section 5.1.

Almost all Moran's I statistics are in the range of 0.2 and 0.4, which indicates that spatial dependency is present in all almost all indicators. Remarkably, the growth rate for nights spent in all accommodations considering all tourists in the period 2001-2009 shows a low value for the Moran's I, while the similar indicator for the period 2001-2007 shows a substantially higher. For the other three indicators, we do not find this difference.

First, we estimated the classical linear model for the specification in Section 2 and then we test whether the model on the presence of spatial dependency.

The results from the linear model are:

- The initial capacity of tourism (number of beds in the accommodations considered) did not affect the growth rate of nights spent in the period 2001-2009;
- The growth rate of capacity had an significantly positive impact on the tourism growth rate.
- The coefficient for GDP per capita is negative and significant.
- The share of natural areas (forest and mountain areas and wetlands) did not have a significant impact on the growth of tourists.
- The presence of beaches in the areas did not have a significant impact.
- The spending for measure 311 and 313 in the recent years (from 2007 onwards) did not have a significant impact on the growth of tourism. However, they might have had an impact on the capacity, and we should check the regression results for this possible relationship.
- Several country dummies were significant: negative coefficients for Czech republic, Denmark, France, Greece, Hungary, the Netherlands, Romania, Slovakia and UK. There tourism growth was significantly lower than for the other countries, see Table 6.
- There is only weak spatial dependency in the case of tourism growth rates. The Moran's I statistic is low but significant.

- All three regressions suffer from a heterogeneity problem, since the Breusch-Pagan test was rejected in all three cases.

Table 5 Estimation results for growth rate of nights spent by non-residents at NUTS2 level for the EU27 in the period 2001-2009.

	linear model		spatial lag model		spatial error model	
	coefficient	p-value	coefficient	p-value	coefficient	p-value
Intercept	0.296	0.08	0.276	0.08	0.278	0.08
Capacity in 2001 (x1,000,000)	-0.161	0.57	-0.161	0.54	-0.163	0.54
Capacity growth	0.202	0.00	0.201	0.00	0.204	0.00
Population (x 1,000)	0.007	0.71	0.007	0.67	0.007	0.67
Population density	0.007	0.00	0.007	0.00	0.007	0.00
GDP per capita	-0.007	0.00	-0.007	0.00	-0.007	0.00
Unemployment	0.004	0.53	0.004	0.53	0.004	0.49
Share of natural areas and forests	0.000	1.00	-0.003	0.98	0.001	1.00
Share of wetlands	0.567	0.25	0.540	0.24	0.537	0.24
Presence of beaches	0.010	0.86	0.009	0.86	0.012	0.81
Spending on measure 311 and 313	0.006	0.70	0.005	0.74	0.004	0.80
Spatially lagged dependent var.			0.053	0.51		
λ					0.047	0.59
Country dummies	yes		yes		yes	
Number of observations	253		253		253	
R ²	0.430		0.430		0.430	
Tests						
Normality (Jarque-Bera) $k=2$	147.0	0.00				
Heterogeneity (Breusch-Pagan) $k=31$	123.6	0.00	123.8	0.00	125.4	0.00
Spatial dependency (Likelihood Ratio)			0.394	0.53	0.199	0.66
Moran's I	0.017	0.03				
Robust LM test spatial lag model $k=1$	0.140	0.71				
Robust LM test spatial error model $k=1$	0.212	0.65				

In addition to the linear model, we explored the spatial lag and error model:

- We explored a spatial lag model, despite the fact that the LM test on spatial lags was not rejected. The spatially lagged growth rate is not significant in the spatial lag model;
- We also explored a spatial error model, despite the fact that the LM test on spatial lags was not rejected. The λ coefficient is not significant.

According to the results in Table 5, the spatial econometric specifications of tourism growth rates (spatial lag and spatial error model) do not contribute to the explanation of the model. However, this does not mean that spatial dependencies do not play any role in the econometric specification. In the econometric specifications, country specific dummies are included to absorb climatic impacts and area-specific characteristics which are not included in the model. In order to solve the heterogeneity problem observed in our estimation results, explanatory variables such as indicators for accessibility (presence of airports, presence of motorways) can be added. Also, we could also check for the correlation of spending and capacity. We have to apply other estimation techniques if significant correlation exists.

Table 6 Country dummies of the estimation results for growth rate of nights spent by non-residents at NUTS2 level for the EU27 in the period 2001-2009.

	linear model		spatial lag model		spatial error model	
	coefficient	p-value	coefficient	p-value	coefficient	p-value
Austria	-0.259	0.15	-0.241	0.15	-0.239	0.16
Belgium	-0.306	0.07	-0.289	0.07	-0.291	0.07
Bulgaria	0.205	0.26	0.197	0.25	0.215	0.21
Czech Republic	-0.540	0.00	-0.508	0.00	-0.514	0.00
Germany	-0.222	0.13	-0.206	0.13	-0.200	0.15
Denmark	-0.624	0.00	-0.590	0.00	-0.607	0.00
Spain	-0.201	0.18	-0.185	0.18	-0.188	0.19
Finland	-0.122	0.54	-0.105	0.57	-0.104	0.58
France	-0.540	0.00	-0.514	0.00	-0.528	0.00
Greece	-0.461	0.01	-0.437	0.01	-0.438	0.01
Croatia	0.354	0.11	0.363	0.08	0.368	0.08
Hungary	-0.616	0.00	-0.590	0.00	-0.601	0.00
Italy	-0.304	0.05	-0.282	0.05	-0.288	0.05
the Netherlands	-0.533	0.00	-0.509	0.00	-0.513	0.00
Poland	-0.150	0.32	-0.135	0.34	-0.133	0.35
Portugal	-0.268	0.16	-0.250	0.16	-0.249	0.17
Romania	-0.437	0.01	-0.417	0.01	-0.423	0.01
Sweden	-0.114	0.52	-0.101	0.54	-0.094	0.57
Slovenia	-0.089	0.73	-0.077	0.75	-0.066	0.78
Slovakia	-0.480	0.02	-0.452	0.02	-0.465	0.01
United Kingdom	-0.531	0.00	-0.511	0.00	-0.515	0.00

We have repeated the analyses for the growth rate in the period 2000-2007 in order to check whether or not the financial crisis in the period from 2008 onwards has had an impact on tourism. It turns out that the coefficients for the regression on the growth rate on the nights spent hardly differ from the results in Table 5.1.

Result of econometric estimation for absolute number of nights spent

Table 7 Estimation results for number of nights spent at NUTS2 level for the EU27 in the period 2001-2009.

	linear model		spatial lag model		spatial error model	
	coefficient	p-value	coefficient	p-value	coefficient	p-value
Intercept	-680157.4	0.71	-1260766.0	0.46	-395475.6	0.83
Capacity in 2009	29.1	0.00	28.2	0.00	31.3	0.00
Population	956.1	0.80	1015.4	0.00	827.7	0.00
Population density	5338.7	0.84	6105.0	0.75	4088.9	0.82
GDP per capita	-4052.1	0.08	-4796.1	0.80	-2706.0	0.88
Unemployment	-120813.9	0.04	-88891.6	0.16	-123468.2	0.07
Share of natural areas and forests	3213074.0	0.40	2673406.0	0.06	2905469.0	0.07
Share of wetlands	4455727.0	0.02	4437967.0	0.36	2536420.0	0.59
Presence of beaches	-1303599.0	0.37	-1342948.0	0.01	-1239532.0	0.02
Spending on measure 311 and 313	-146691.7	0.00	-155881.7	0.30	-191336.9	0.18
Spatially lagged dependent var.			0.198	0.00		
λ					0.446	0.00
Country dummies	yes		yes		yes	
Number of observations	253		253		253	
R-squared	0.686		0.699		0.730	
Tests						
Normality (Jarque-Bera), k=2	744.2	0.00				
Heterogeneity (Breusch-Pagan), k=31	647.6	0.00	690.4	0.00	600.1	0.00
Spatial dependency (Likelihood Ratio)			7.8	0.01	24.4	0.00
Moran's I	6.8	0.00				
Robust LM test spatial lag model, k=1	2.0	0.16				
Robust LM test spatial error model, k=1	15.3	0.00				

Secondly, we tested the specification for the classical regression of nights spent on spatial dependency as well, see Table 7 and Table 8 .

- The available capacity has a significant positive impact on the number of nights spent in 2009. More capacity implies more nights spent;
- Tourism increases with the size of the population and not with the population density;
- GDP per capita does not affect the number of nights spent;
- Tourism declines with higher levels of unemployment, although the impact is not strongly significant;
- The share of (dry-land) natural areas has a positive effect on tourism, while wetlands do not.
- The presence of beaches has a negative effect on tourism. Probably, tourism in regions with beaches is much more located in the urban areas near the beaches;

- The total spending on measures 311 and 313 do not have an impact. However, the spending might have an impact on the tourism capacity (number of beds), and therefore we should test for this relationship;
- France has a significant negative dummy while Croatia has a significant positive dummy. France has a significantly lower growth rate which is not captured by any of the other characteristics included in the specification;
- Normality of errors is rejected and heterogeneity is not rejected;
- There is spatial dependency present in the estimation results, because the Moran's I statistic is significant.
- The test for the spatial lag model is rejected, while the test for the spatial error model is not rejected.
- The spatially lagged number of nights spent is significant, despite the fact that the test on the spatial lag model is rejected. The coefficients of the other variables hardly change compared to the linear model.
- In the spatial error model, the signs and significance levels of coefficients did not change, but the magnitude of the significant coefficients did. There is still spatial dependency left in the spatial error model.

Table 8 Country dummies of the estimation results for number of nights spent at NUTS2 level for the EU27 in the period 2001-2009.

	linear model		spatial lag model		spatial error model	
	coefficient	p-value	coefficient	p-value	coefficient	p-value
Austria	2885737.0	1.00	2328057.0	0.19	2384832.0	0.21
Belgium	-7819.9	0.88	155316.5	0.93	-654911.0	0.73
Bulgaria	283541.8	0.86	487711.8	0.78	92634.4	0.97
Czech Republic	-338507.1	0.13	-47444.2	0.98	-111005.4	0.96
Germany	-2371496.0	0.91	-2271239.0	0.12	-2701483.0	0.10
Denmark	251827.6	0.91	483121.5	0.81	448345.8	0.87
Spain	185198.1	0.51	-126065.4	0.93	1596866.0	0.39
Finland	-1394137.0	0.00	-855269.3	0.66	-1196445.0	0.62
France	-4771642.0	0.93	-5096816.0	0.00	-5921795.0	0.00
Greece	-166244.7	0.01	-59066.5	0.97	-327161.4	0.87
Croatia	6305878.0	0.68	6274298.0	0.00	6353137.0	0.01
Hungary	-802436.9	0.95	-614619.8	0.73	310361.9	0.88
Italy	-92722.4	0.50	-1360766.0	0.38	-294399.5	0.87
the Netherlands	-1334694.0	0.77	-1168533.0	0.52	-1543775.0	0.45
Poland	-469906.7	0.78	-384076.5	0.80	-302223.8	0.86
Portugal	577260.8	0.22	224855.8	0.91	1378195.0	0.56
Romania	-2312310.0	0.14	-1963433.0	0.25	-2461297.0	0.26
Sweden	-2817722.0	0.79	-2291417.0	0.19	-2485167.0	0.29
Slovenia	754085.0	0.81	-187001.9	0.94	89844.1	0.97
Slovakia	-526054.4	0.32	-430461.3	0.83	640715.5	0.77
United Kingdom	-1650219.0	1.00	-1388366.0	0.36	-1958861.0	0.27

The results of the analyses of the number of nights spent by tourist showed that spatial dependency is present in the specifications of the tourism model. Spending on measure 311 and 313 do not have a direct impact on tourism, but we have to test whether spending on both measures is affecting the number of beds in a region.

5 Conclusions

The objective of the Rural Development Programs (RDP) of the EU is to stimulate the economy in rural areas. This paper analysed the impact of RDP measures on the growth of tourism and on the economy within a spatial analysis framework. For the spatial regression analyses, we used the indicators of the CMEF framework as introduced by the European Commission. We apply our analyses to tourism data at NUTS2 level. The data are collected from Eurostat.

The explanatory spatial data analysis clearly showed the spatial dependency of the tourism indicators, i.e. number of nights spent by non-residents. For three different years, the number of nights spent by non-residents were significantly different from zero. In contrast, the spending on the RDP measure encouraging tourism was not uniformly distributed over the NUTS 2 regions of the EU. As a result we explored a regression analysis and tested for spatial dependencies afterwards. In the case of the tourism growth model, there is little evidence for spatial dependencies in the residuals of the model despite a significant positive Moran's I. In the case of the absolute developments of tourism, spatial dependencies turned out to be present. The appropriate model was the spatial error model. The capacity of tourism accommodations had a significant impact on tourism as well as the size of the population of the region. The presence of natural areas also had a positive impact. The spending on the encouragement of tourism turned out to be insignificant. One reason for this finding might be the concentration of spending in particular part of the EU. Secondly, the spending is rather low compared to the economic value of the tourism sector. Moreover, the spending is often project-based. It is more likely that the impact of spending can be observed at lower levels, such as the level of municipalities for instance. Preferably, the spatial analysis is repeated at municipality level.

Acknowledgements

We would like to thank Eveline van Leeuwen en Martijn Smit for their helpful comments on the results and earlier drafts of this paper. The authors gratefully *acknowledge funding* from the EU under scheme FP7 –KBBE– Knowledge based bio economy.

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