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Smart specialisation and tourism: Understanding the priority choices in EU regions

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ABSTRACT

This paper examines the regions that have chosen tourism-related strategies as a priority of smart specialisation (S3) policies within the reformed EU Cohesion Policy. The paper collects data provided by the Smart Specialisation Platform (Eye@RIS3) from 2013 to 2018 for 191 EU regions to investigate regional determinants affecting the probability to choose tourism as one of their S3 priorities. Results show that tourism is considered as priority for almost half EU regions of the sample and that these regions have not homogeneous characteristics. Tourism represents the strategic choice of already developed tourism destinations as well as regions with no tourism specialisation. No specific relationship emerges between tourism concentration and the choice of tourism as their S3 priority.

1. Introduction

Recently in the European context, the *smart specialisation* has become a key concept within the reformed EU Cohesion Policy [1,2]. These new place-based policy thinking aimed at changing governance behavior is based on a bottom-up approach where key stakeholders developed a shared vision by means of a dynamic and entrepreneurial discovery process. These strategies focus on the prioritisation of public resources in knowledge investments on particular activities in order to strengthen comparative advantages in existing or new areas. In 2012 the EU "Guide to Research and Innovation Strategies for Smart Specialisation" [43] defined the RIS3 as *integrated, place-based economic transformation agendas,* having five main characteristics: 1) focus on key national/regional priorities; 2) emphasis on each country's/region's strengths, competitive advantages and potential for excellence; 3) encouragement of technological and practice-based innovation to stimulate private sector investment; 4) involvement of stakeholders and 5) inclusion of monitoring and evaluation systems. According to the European Commission this new policy approach has become a key instrument for place-based development [44]. The smart specialisation (SS) has been defined *as the capacity of an economic system to generate new specialties through the discovery of new domains of opportunity* based on the regional concentration of knowledge and competences (*diversification, transition, modernisation or the radical foundation of industries and or services) to promote structural change* [3]. This new policy approach reverses completely the perspective of the previous one in the direction of giving to territories and states opportunities to choose strategies following their place-based economic advantages and deciding which specific sectors to prioritise.

Potentially, a large number of regions may have the interest to invest on tourism: regions having natural and cultural resources and regions already characterised by a high level of tourist flows, but also regions that would transform themselves in a tourism destination. However, the choice of tourism sector has pro and cons that need to be accounted for: on the one hand the industry is growing and seems relatively more resilient to economic shocks or crisis with respect to other sectors ([4], for the case of Italy [5]; for the case of Greece); on the other hand it is based on low level of capital per worker, technology, and innovation; furthermore, if tourism consumption is not ruled adequately of by local policies might produce adverse effects on quality of life of the resident population as well as various types of negatives externalities [6–9]. Therefore, it is likely that tourism would not necessarily be the best choice for every type of region. It is probably the best choice for those regions that already have strong regional comparative advantage on tourism to further exploit this advantage; and regions where tourism is a complementary sector to differentiate the regional economy. However,

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it might not be the right choice for lagging regions without really strong tourism-based resources, such as those without "unique" natural amenities and or tourism infrastructures (accommodation, restaurants, cultural activities, etc.). To date, many regions, including the vast majority of peripheral and inner areas, seem to prioritise tourism development.

The present paper aims to link these prioritisation decisions with the observe potential processes of transformation or regeneration appearing in these regions covering aspects connected with the industrial diversification, regional branding, new entrepreneurial activities in diversifying areas and the use of Key Enabling Technologies (KETs) to increase the value-added of Tourism activities in the region. Specifically, the paper explores tourism-related priorities chosen by NUTS-2 regions[1] and aims to investigate the determinants of regional political intentions and their underlying rationalities. Furthermore, it investigates whether regions well interpreted the aim of the policy that is using SS as economic diversification strategy (complementarity). In a further development of this work it would be interesting to examine whether these intentions are followed by proper local actions and investments towards this direction. This paper contributes to the existing literature in two main ways. First, to the best of our knowledge, it is the first work that empirically investigates the relationship between smart specialisation policies and tourism sector. Second, it provides a complete overview of tourism as one of the main strategies chosen by UE regions after the renewed Cohesion Policy [10].

The paper is structured as follow. Sections 2 provides a literature review on smart specialisation policies with a specific focus on the strategy applied to the tourism sector. Section 3 describes data used and offers a taxonomy of tourism regions based on geographic, economic, institutional and tourism characteristics. Section 4 describes the methodology and Section 5 shows main results and some robustness checks. Finally, Section 6 summarises the main findings and presents some comments in light of the recent literature. Limitations and further developments are also included.

2. Literature review

2.1. Smart specialisation strategy

The paradigmatic change in the EU regional innovation policy generated a keen interest in researchers in the last decade. Boldrin and Canova [11]; in their seminal paper, found empirical evidence of the limited role of previous programs in pursuing regional economic convergence. It followed a debate among scholars and institutions on the weakness of previous programs and possible solutions. Essentially, the disagreement regards the design and primary target of the new policies. Two opposite positions emerged: the space-neutral (or spatially blind) and the place-based approaches; for the former, supported by the World Bank Report (2009), regional policies should target regions where agglomeration economies already work and redistribute to weaker regions afterwards and should follow a top-down approach [48]; while for the latter, supported by the European Union [12] policies should target the weaker regions and should be designed following a bottom-up approach.

More specifically, the concept of Smart Specialisation (SS) has been the focus of scientific publications starting from 2011. According to Mora et al. [13]; who report a bibliometric analysis, in 2017, a total of 274 publications were found (including books, book chapters, conference papers and scientific articles). In the first period, a large group of researchers analyse the concept of SS (i.e. [2,14–20] and [3] and they represent the core literature about this new policy prioritisation agenda for regional innovation policy. In addition to the researchers mentioned above, Camagni and Capello [21] and Camagni et al. [22] contribute to the debate by criticising the application of S3 policies at the regional level. In particular, authors underline the need to consider heterogeneity among regions and their different patterns of innovation.

In more recent papers, McCann and Ortega-Argiles [2,15,16,23] focus on the importance of regional innovation policies, the SS concept and application, implementation and examples. Crescenzi et al. [24] analyse the case of Italian Mezzogiorno while Balland et al. [25] study regional diversification as the final aim of SS. Iacobucci and Guzzini [26] focus on the concepts of relatedness and connectivity by using a qualitative approach.

Capello and Kroll [27]; analysing the smart specialisation policy from theory to practice, underline strengths and weaknesses of the strategy implementation. Despite some limits of the strategy, this remains "a good starting point" [27] p. 1403). Indeed, according to the authors, this policy will be able to pursue at the same time cohesion and competitive goals for the local development. However, the strategy is not without drawbacks. Indeed, Sotarauta [28] discusses five traps related to smart specialisation process: institutional conflict, governance, mobilisation, shared vision, capability.

With some exceptions, the majority of studies on this topic are not empirical and give a policy-oriented perspective. Furthermore, they do not undertake specific analysis of specific sectors.

2.2. Smart specialisation strategies in tourism

The literature finds confirmation of the tourism-led growth hypothesis [29–32]. The economic growth literature pointed out the role of innovation, technology and human capital for long-term economic growth [33,47]. Concerning other economic activities, tourism production is characterised by being a low-tech and low-skill sector. However, with the development of the Smart Growth Agenda, all sectors, including tourism, need to face this challenge. Recently, a stream of the literature on regional and urban innovation focuses on the importance of developing smart tourism. There is not a widespread definition of smart tourism. An interesting attempt in this direction is provided by Gretzel et al. [34] and Gretzel [35]; for which smart tourism is strictly linked to the destination, implies public-private partnerships and is characterised by three components: a smart experience, a smart business ecosystem and a smart destination. All components are interconnected to each other and implicate the collection, exchange and processing data.

Studying smart tourism *per sé* is not the aim of the present work. At this stage, the paper focuses on tourism-related choices within the framework of SS strategies and the reformed EU Cohesion Policy. It is recently recognised that SS in tourism has so far received little attention in the literature, and there is a research gap [36,37]. Indeed, the relationship between SS and tourism has been the object of only six papers up to now. The analyses included in these works use different methodologies, answer to different research questions and focus on the country level [36], regional level ([38,49], and, the majority of cases on single case study [36,39,40]. One of the first published paper by Del Vecchio and Passiante [39] analyses the case of Apulia, an Italian region located in the Southern part of the country, famous as a seaside tourist destination. As research question, authors state that *"it must first be determined whether tourism is a vocational sector for Apulia and how it can be developed as a primary contribution to attaining the region's intelligent growth objectives"* (p. 164). Even though the question is of primary importance in that context, the paper only describes the attractiveness of the region by listing natural, cultural and agro-food heritage as a good reason for classifying Apulia as a tourism region. Conclusions underline the need to introduce SS opportunities into the region without any specific indication about the specific strategy. Borseková et al. [40]; with a focus on Slovakia, link tourism and economic development to innovation and S3 policy strategies. According to the authors, tourism is the only possible way to provide development, employment and well-being in peripheral regions. Their qualitative analysis demonstrates

[1] Nomenclature of Territorial Unit for Statistics (NUTS) defined by the European Commission.

that potentially Slovakian regions have competitive advantages in tourism but need to improve innovation capacity in order to grow in tourism competitiveness.

Romão and Neuts [49] investigate tourism specialisation of 252 European NUTS-2 regions in 2011 to understand the link between tourism, smart specialisation and sustainable development in the direction of Millennium Goals. Their results, based on a structural equation model (SEM), show that different regional patterns coexist in tourism dynamics. On the one side, regions with high specialisation in tourism experience problems linked to having a low human capital workforce, low innovation and low value-added generated by the sector. On the other side, regions with a high level of human capital but not necessarily specialised in tourism can generate higher innovation and value-added in tourism respect to the previous types of regions. Overall, those findings suggest that the level of regional human capital matters for the success of tourism and smart specialisation in reducing economic divide and in obtaining sustainable development in the direction of the achievement of the Millennium Goals.

Bellini et al. [38] study the linkage between tourism, smart specialisation and territorial resilience in the EU regions. By using data gathered from the Smart Specialisation Platform (Eye@RIS3 henceforth), they focus on regions that chose tourism as a strategic sector for regional smart specialisation growth. The study is based on a sample of 80 regions/countries on a total of 202 regions registered in the Platform by May 2016. By analysing the documents available in the Platform, the authors perform a qualitative and descriptive analysis on five policy approaches: 1) tourism modernisation, 2) tourism for innovation culture, 3) tourism-pulled innovation, 4) tourism-generating innovation and 5) tourism moderation. The main contribution of the paper regards the provision of a conceptual framework that links tourism innovation policies and local economic resilience (supported by some examples). Even though the work is based on a descriptive analysis (and despite tourism sector is known to be more labour than capital intensive and with low content of innovation), the authors conclude that tourism sector can be used among the key sectors to pursue smart growth in resilient economies.

Benner [36] focusing on three tourist destinations located respectively in Cyprus, Israel and Tunisia consider tourism as a possible key sector to obtain smart specialisation thanks to its ability to generate agglomeration economies. Specifically, involving firms of the same but also of different sectors, tourism consumption can boost cluster and develop urbanisation as well as localisation economies. The author points out the importance to have sensitive institutions to tourism development.

Weidenfeld [37] classifies three possible diversification strategies regions might follow in choosing tourism as smart specialisation strategy: 1) diversification across related tourism sub-sectors (intra--industry); 2) diversification across tourism and other sectors (inter-industry); 3) tourism as a catalyst across other non-tourism sectors. In the context of SS, each region should select the appropriate approach *depending on the extent to which tourism is concentrated or diverse in destinations* (p. 15). This framework can be used in further researches to describe and understand the rationale of regional choices as well as the role of tourism in SS.

Overall, the literature agrees on the potential of tourism as a driver for smart growth. The role of institutions is seen as crucial to pursue this purpose. However, none of these previous works investigates which kind of regions is prioritising tourism as a key strategy. Indeed, the success of tourism-related strategies depends on the characteristics of regions in terms of economic and socio-demographic, cultural structure as well as institutional and geographic features.

3. Data

The selection of regions that chose a tourism-related activity as priority comes from the Smart Specialisation Platform (Eye@RIS3).[2] This tool was created by the European Commission in 2011 to support countries/regions in developing and reviewing their strategies and finding potential partners for collaboration. Eye@RIS3 was revised in September 2018, and according to this last update, the Platform contains information on 179 regions and 18 countries.[3] It is worth noticing that the implementation of the policy depends on each Member State's institutional and territorial organization as well as on the administrative level responsible for the competences on R&D and innovation (NUTS-1, 2 or 3). Moreover, the registration in the Platform is not compulsory, and the number of registered regions is continuously increasing.

The analysis focuses on European NUTS-2 regions; only in a few specific cases, the only information available was at country level (i.e. Cyprus, Estonia, Latvia, Lithuania, Luxembourg and Malta). The Eye@RIS3 application allows one to collect information by selecting two main options: Title/Description of priority or/and Territorial level. It is also possible to include three other advanced search fields: Economic domains, Scientific domains and Policy objectives. Since the complex nature of tourism, that includes more than one economic sector or area of scientific and political interest, in this paper, we classify the regions as prioritising in tourism if the world "Tourism" is included into the first option of research, namely the Title/Description of the priority. In total, we collect data on 276 EU-28 regions. Fig. 1 shows regions, in total 89 regions out of 276 that prioritise tourism as strategic policy, namely the 32% of the total number of European regions and, more specifically, the 43% of the total number of NUTS-2 regions registered in the Eye@RIS3.

3.1. A taxonomy of tourism regions

As shown in Fig. 1, it does not exist a single pattern that identifies tourism regions in Europe. However, if we search for similar characteristics, these regions can be clustered according to some geographical, economic, institutional and tourism similarities (see Table 1 for a description of variables used in this analysis).

3.1.1. Geographical characteristics

In terms of their geographical characteristics, the majority of tourist regions in Europe seems to be located near to the coast. It is well-known that sea and sand-based tourism is predominant in the Southern and Mediterranean European countries. This sample includes the quasi total number of islands (72%). Overall, tourism can be considered the driving sector for islands such as the Balearic Islands and Canarias in Spain; Sardinia and Sicily in Italy; Ionian Islands, Southern and Northern Aegean, and Crete in Greece; Martinique, Guadalupe and Reunion in France.

3.1.2. Economic characteristics

In terms of economic characteristics, the majority of regions in our sample have a medium-low GDP per capita with respect to the European average (83%). Only 7 capital regions are included in the group (Hovedstaden-Copenaghen, Berlin-Berlin, Attica-Athens, Lazio-Rome, Cyprus-Nicosia, Malta-Valletta and Lisbon-Lisbon). In terms of labour productivity growth rate, most of the regions are classified as *"catching-up"* since they grow at least 5% more than the *"Frontier"* regions. As far as the "eligibility" for ERDF and ESF in the period 2014–2020 is concerned, more than half of the regions are classified as "More developed" (52%), while the 31% as "Less developed".

[2] For more information see the website of the S3 Platform: http://s3platform.jrc.ec.europa.eu/home.

[3] Data used in this work have been retrieved on 26 September 2018, since that moment information could have changed.

Notes: darker colour represents regions choosing tourism as a priority. To better show regions into the map, the boxed islands (Guadalupe and Martinique on the South West side; and Reunion in the South East) were repositioned.

Fig. 1. European NUTS-2 regions choosing a tourism-related priority in Eye@RIS3.
Notes: darker colour represents regions choosing tourism as a priority. To better show regions into the map, the boxed islands (Guadalupe and Martinique on the South West side; and Reunion in the South East) were repositioned.

Table 1
Descriptive statistics of variables.

Variable	Obs	Mean	Std. Dev.	Min	Max
Geographical variables					
Population density	89	199.5011	439.6676	5.2	3811.3
Islands	89	.2022472	.4039514	0	1
Regional capital	89	.0786517	.2707195	0	1
Mostly Intermediate	89	.258427	.4402502	0	1
Mostly Rural	89	.4831461	.5025471	0	1
Mostly Urban	89	.247191	.4338228	0	1
Economic variables					
GDP per capita	89	23,374.16	8406.295	9100	47,600
Lagging	89	.3595506	.4825875	0	1
Catching up	89	.4157303	.4956398	0	1
Keeping pace	89	.247191	.4338228	0	1
Diverging	89	.258427	.4402502	0	1
Frontier	89	.0449438	.2083546	0	1
More Developed regions	89	.5168539	.5025471	0	1
Transition regions	89	.1685393	.3764655	0	1
Less developed regions	89	.3146067	.46699	0	1
Innovation Leaders	84	.2142857	.4127903	0	1
Innovation Strong	84	.1666667	.3749163	0	1
Innovation Moderate	84	.4642857	.5017182	0	1
Innovation Modest	84	.1547619	.3638498	0	1
Regional Innovation Scoreboard	84	83.47923	34.36758	34.32287	169.9625
Institutional variables					
Quality of Government	89	-.1120178	1.018118	−2.37024	1.638
Tourism variables					
Nights of stay per capita	84	10,219.76	14,574.79	489.2808	64,967.87
Tourism GDP contribution	89	3.891011	2.132681	1.5	13.8

3.1.3. Institutional characteristics

Considering the Quality of Government Index (QoG), issued by the Quality of Government Institute of the University of Gothenburg as well-known measure of the performance of regional institutions, the sample shows a low institutional quality with respect the European average. The index is composed of four main governance categories: control of corruption, rule of law, government effectiveness and government accountability [41]. Fig. 2 shows the distribution of regions that chose tourism as a priority according to the QoG. If we consider the European average, approximately 50% of the regions under analysis are below this average.

3.1.4. Tourism characteristics

Thanks to the information provided by Eye@RIS3, it was possible to analyse not only regions that prioritised tourism but also the total number of priorities chosen by these regions. The ratio between the number of tourism-related priorities and the total number of priorities in each region can be considered as a proxy of regional concentration of tourism sector. Fig. 3 shows the heterogeneity of this indicator by using four classes: 0–20% and 20–40% as a low level of concentration and 40–60% and 60–100% as medium-high level concentration. On the one hand, a large group of regions shows a low level of concentration. This fact could imply that in some tourism destinations, the aim is to diversify tourism and other sectors, and as explain by Weidenfeld [37] this can be considered as a diversification inter-industry strategy. This kind of strategy has been chosen by already tourism-developed regions such as Catalunya, Andalusia and Canarias in Spain; by Tuscany, Lazio, Emilia-Romagna, and Tirol in Italy; by Algarve in Portugal; and by Rhone-Alpes, Provence-Alpes and Côte d'Azur in France. According to Bellini et al. [38]: Provence-Alpes and Côte d'Azur chose the approach to modernise and increase technology standards and marketing techniques; Andalusia chose to increase the value of cultural and creative regional production; Algarve and Canarias chose to use innovation to mitigate negative externalities generated by tourism consumption and production; Rhone-Alpes chose to pull technologies in textile, plastic

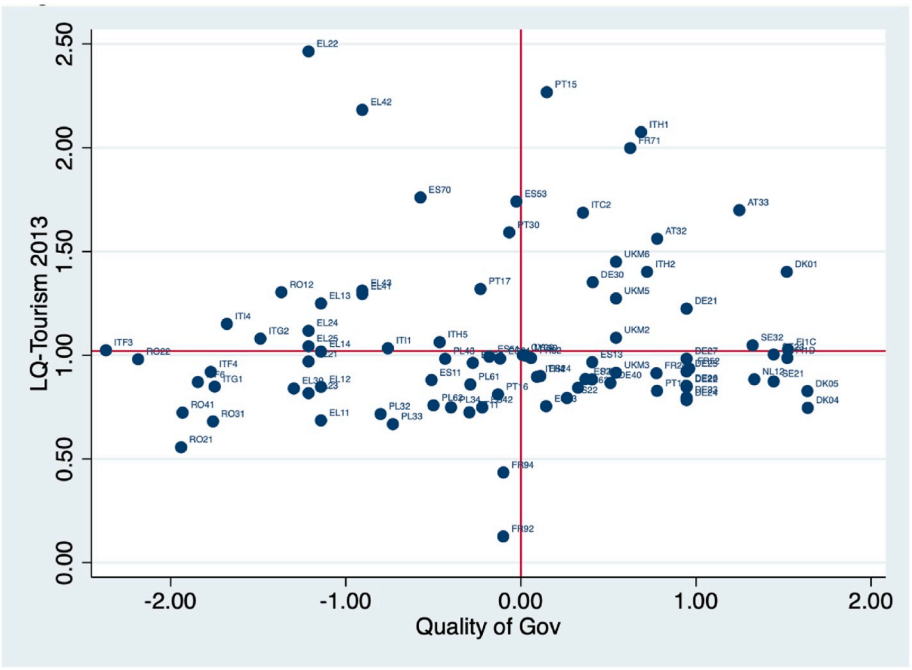
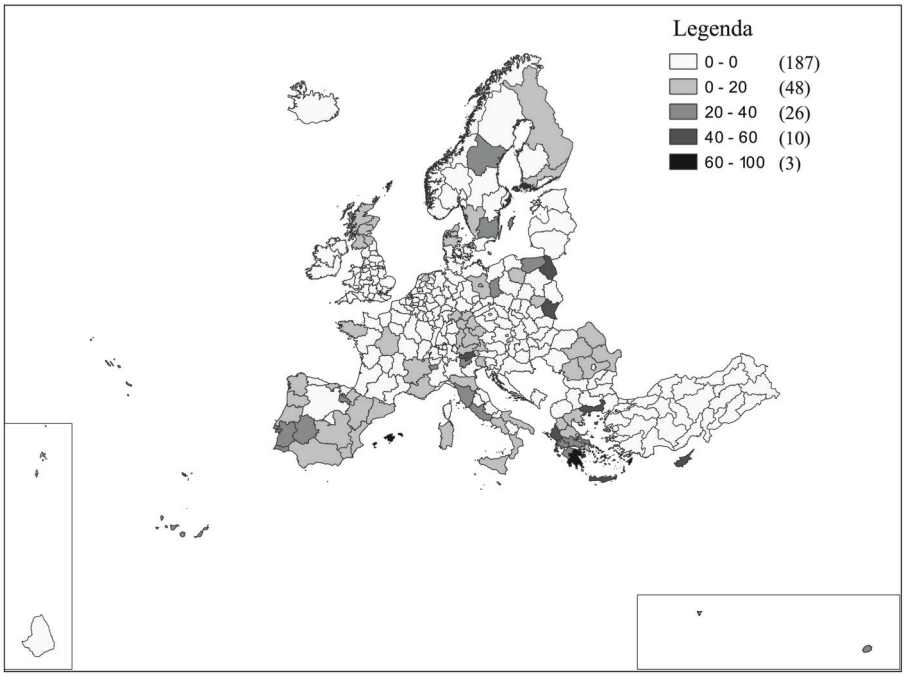


Fig. 2. Scatterplot of regional distribution according to location quotient and quality of government variables.
Note: the location quotient is an indicator computed as the tourism's share of regional employment over the tourism's share of national employment. More specialised if higher than 1. Less specialised if lower than 1. The regional tourism share has been calculated with the employment of the following NACE Rev2 economic activities: transports, accommodation, food and beverage, rental, travel agencies and tour operators services.



Notes: values considered for the natural brakes are percentages; in parenthesis, the number of observations for each class. To better show regions into the map, the boxed islands (Guadalupe and Martinique on the South West side; and Reunion in the South East) were repositioned.

Fig. 3. Maps of weighted decisions (number of tourism-related priorities over the total number of priorities) by European NUTS-2 regions.
Notes: values considered for the natural brakes are percentages; in parenthesis, the number of observations for each class. To better show regions into the map, the boxed islands (Guadalupe and Martinique on the South West side; and Reunion in the South East) were repositioned.

and other sectors that are strictly linked with sport and mountain tourism. The strategy has also been chosen by non-tourism regions that use this sector as a catalyst for diversifying other non-tourism sectors such as Comunidad Foral de Navarra, Berlin, Apulia, Scotland. On the other hand, a small group of regions chose tourism as a quasi unique area of investment and development; those regions that show a high level of concentration are: the Balearic Islands, Southern Aegean and Peloponnesus. In this latter case, the strategy is to diversify across related tourism sub-sectors, can be considered as an intra-industry strategy [37].

4. Methodology

The work focuses on testing two main hypotheses. First, prioritising tourism is a rational choice given the characteristics of the regions (the underlined rationality). Second, regions well interpreted the aim of the policy that is using this specific program as an economic diversification strategy (complementarity).

To do so, this section and the following one empirically analyse the drivers of the choice of tourism as a smart specialisation strategy at the regional level. As will be explained more in-depth in the next section, the analysis uses cross-section data on the following empirical model:

$$Tourism\ \ Priority_i = f(G_i + E_i + I_i + T_i) \quad (1)$$

where:

Tourism Priority = is a dummy variable that values 1 if the region *i* chose a tourism-related activity as a strategic priority in the Eye@-RIS3 application
G = geographical and demographic variables
E = economic variables
I = institutional variables
T = tourism variables

The probability of prioritising tourism sector depends on the geographical location of the region, their resource endowments (specifically natural and cultural-based resources) as well as their demographic structure. It also depends on the actual economic structure, including the innovation capacities of the region, on institutional factors and on the role that tourism already plays at the regional and national level.

The empirical model proposed in the present paper investigates which regional characteristics affect the decision to choose tourism as smart specialisation strategy to the aim of indirectly understand whether this decision is likely to be a successful one or not.

A detailed description of the variables employed in the model is provided in Table 2.

5. Results

Table 3 shows the regression results obtained by performing a discrete choice model estimated with a logit regression. Odds ratio and marginal effects are both reported. The odds ratio are defined as OR = $e^{\beta i}$. When an odds ratio values less than one (the coefficient shows a negative sign) the probability of choosing tourism as a priority is less likely than the probability to prioritise another sector. On the opposite, when an odds ratio has a value greater than one (the coefficient shows a positive sign) the probability of choosing tourism as a priority is more likely than the probability of choosing another area of specialisation. When the odds ratio is exactly one, this implies that the odds are even. *Ceteris paribus*, for continuous variables, an odds ratio greater than one suggests that the probability of a successful event increases as the value of the continuous variable increases. For dichotomous variables, an odds ratio greater than one indicates that the probability of success is higher than that of the reference group. Marginal effects are useful to measure how much the dependent variable changes due to one-unit change of the explanatory variable.

The dependent variable *Tourism Priority* is defined as $Y_i = (Y_1, Y_2)$: where Y_1 takes the value one if region *i* chooses tourism as a priority in the EYE@RIS3 application; and Y_2 takes the value zero if region *i* choose another area of specialisation. The estimation does not consider regions that are not registered into the S3 Platform (29 in total). As Table 3 shows, two main models have been performed: Model 1 does not consider the specific performance in innovation of each region (from leader to modest innovators), Model 2 includes all variables. The first column of the two models shows the marginal effects, while the second

Table 2
Variables and data sources.

Variable	Year	Source	Definition
Dependent variable			
Tourism Priority	2013	RIS3 Platform	1 = if the region has prioritised tourism; 0 = otherwise
Geographical and demographic variables			
Population density	2013	Eurostat	Population/Km^2
Islands	t.i.		1 = island; 0 = otherwise
Regional Capital	t.i.		1 = regions where the capital of the country locates; 0 = otherwise
Mostly intermediate	2014	OECD	1 = if between 50% and 70% of their pop. Lives in a metropolitan area; 0 = otherwise
Mostly rural	2014	OECD	1 = if less than 50% of their pop. Lives in a metropolitan area; 0 = otherwise
Mostly urban			Base category of Mostly intermediate and Mostly rural
Economic variables			
GDP per capita	2013	Eurostat	GDP purchasing power standard (PPS) per inhabitant
Catching-up (Labor product.)	2000–15	OECD	1 = labor productivity grew by at least 5% more than the Frontier; 0 = otherwise
Keeping pace (Labor product.)	2000–15	OECD	1 = labor productivity grew within±5% with respect to the Frontier; 0 = otherwise
Diverging (Labor product.)	2000–15	OECD	1 = labor productivity dropped by at least 5% than the Frontier; 0 = otherwise
Frontier			Base category of Catching-up, Keeping pace and Diverging
More developed (GDP PPS)	2007–09	Eurostat	1 = if GDP per capita was higher than 90% of the EU-27 average in 2007–09 (regional eligibility for the ERDF and ESF during the programming period 2014–20); 0 = otherwise
Transition regions (GDP PPS)	2007–09	Eurostat	1 = if GDP per capita was 75%–90% of the EU-27 average in 2007–09 (regional eligibility for the ERDF and ESF during the programming period 2014–20); 0 = otherwise
Less developed			Base category of More developed and Transition regions
Regional Innovation Scoreboard	2013	European Commission	Continuous variable (RIS) or 4 dummy variables: 1 = Innovation Leader: regions with a relative performance more than 20% above the EU average; 1 = Strong Innovators: regions with a relative performance between 90% and 120% of the EU average; 1 = Moderate Innovators: regions with a relative performance between 50% and 90% of the EU average; 1 = Modest Innovators: regions with a relative performance below 50% of the EU average.
Institutional variables			
Quality of government index (QoG)	2013	Quality of Government Institute	Index composed by four governance categories: control of corruption, rule of law, government effectiveness

(*continued on next page*)

Table 2 (*continued*)

Variable	Year	Source	Definition
			and government accountability. 0 = EU average
Lagging regions	2013	European Commission	1 = "Low income" or "Low growth", 0 = otherwise. Low income: values 1 if the region has a GDP per head in PPS below 50% of the EU average in 2013, 0 otherwise. Low growth: values 1 if the region has a GDP per capita up to 90% of EU average and did not converge to the EU average between the years 2000 and 2013 in Member States with a GDP per head in PPS below the EU average in 2013, 0 = otherwise.
Tourism variables			
Nights of stay per capita	2013	Eurostat	Number of nights of stays per 1000 inhabitants
Tourism GDP contribution	2013	WEF	Share of travel and tourism GDP contribution to the national GDP

Note: t.i. = time invariant; RIS, Research and Innovation Strategy for Smart Specialisation; OECD, Organization for Economic Co-operation and Development; WEF, World Economic Forum.

column reports the odds ratio.

Within the geographical variables, the coefficient of *islands* and *regional capital* are positive and statistically significant in both specifications. The positive sign indicates that regions located in islands as well as regions where the country capital is located, are more likely to choose tourism as a priority. While for the case of islands, the positive sign is probably explained by the resource endowments, which naturally give them a comparative advantage in tourism, the interpretation of the second variable is less straightforward. It is likely that the capitals of regions prioritise tourism as a way to diversify economic activities and as a complementary activity to other economic sectors.

Among the economic variables, *GDP* per capita is negative and statistically significant in Model 2 only. The negative sign suggests that the lower the GDP per capita, the higher the probability for a region to choose tourism as a priority. Moreover, the coefficient of *Catching-up* variable is positive and statistically significant, meaning that those kinds of regions are more likely to choose tourism as an area of specialisation than *Frontier* regions. In Model 1 a negative and statistically significant coefficient is found for regions that are classified as *Transitions* for the ERDF (European Regional and Development Fund) and ESF (European Social Fund) eligibility during the programming period 2014–2020. This result indicates that those kinds of regions are less likely to choose tourism as a priority with respect to those classified as *Less developed*.

When controlling for the degree of innovation (Model 2) results show that innovation does not impact on the choice of tourism because the content of innovation of tourism firms is shallow.

The institutional variable measured as an interaction variable between having a quality of government below the European average and being lagging regions appears as the variable affecting more the choice to specialise in tourism for a region. This expected result empirically confirms the intuition of McCann and Ortega Argilés [2]: *"For very isolated regions, however, the smart specialisation argument appears to offer only minimal possibilities, because the lack of scale is likely to reduce the effectiveness of the policy approach. In these cases, rather than funding R&D, the priorities might centre on the promotion of connectivity in certain natural environmental or tourism activities"* (p. 1298). Moreover, a recent analysis has demonstrated that low institutional capacity in European lagging regions might not represent a limitation for future economic development [42].

Table 3
Logit regression results: marginal effects and odds ratio.

Model	1		2	
Dependent variable	Regional Tourism Priority		Regional Tourism Priority	
	Marginal effects	Odds Ratio	Marginal effects	Odds Ratio
Geographical and demographic variables				
Population density	−0.0005	.9994952	−0.0004	.9995785
	(0.0005)	(.0005465)	(0.0006)	(.0005839)
Islands	2.2*	9.29688*	2.2*	8.752297*
	(1.2)	(11.35073)	(1.3)	(11.15299)
Regional capital	3.0**	20.55632**	2.5*	12.61224 *
	(1.5)	(30.54969)	(1.5)	(18.53098)
Mostly Intermediate	0.3	1.334062	0.3	1.286588
	(0.5)	(.7093799)	(0.6)	(.7181586)
Mostly Rural	0.2	1.251074	0.01	1.010708
	(0.5)	(.6653687)	(0.6)	(.5683849)
Economic variables				
GDP per capita	−0.00009	.9999055	−0.0001**	.9998821 **
	(0.00006)	(.0000578)	(0.00006)	(.0000584)
Catching-up (Labour productivity)	2.8**	16.79458**	2.4*	11.13544 *
	(1.3)	(22.49724)	(1.3)	(14.89766)
Keeping pace (Labour productivity)	1.7	5.506627	1.1	2.977267
	(1.3)	(7.296196)	(1.3)	(3.980303)
Diverging (Labour productivity)	1.7	5.714.513	1.5	4.610575
	(1.3)	(7.545833)	(1.3)	(6.15008)
More Developed regions	0.5	1.707804	1.3	3.679342
	(1.0)	(1.659162)	(1.0)	(3.768138)
Transition regions	−1.8**	.1597254**	−1.3	.2787392
	(0.9)	(.147679)	(1.0)	(.2725961)
Innovation leaders (RIS)			0.9	2.484585
			(1.2)	(2.944592)
Innovation Strong (RIS)			−1.0	.3863769
			(1.1)	(.4215471)
Innovation Moderate (RIS)			−0.10	.9062163
			(0.9)	(.8365183)
Regional Innovation Scoreboard (RIS)	0.01	1.013212		
	(0.01)	(.0121491)		
Institutional variables				
QoG_Low*Lagging	2.5***	11.63126***	2.1***	8.530737***
	(0.8)	(8.760165)	(0.8)	(6.449382)
Tourism variables				
Nights of stay per capita	0.00006*	1.0000558*	0.00007**	1.000073**
	(0.00003)	(.00003262)	(0.00004)	(.000037)
Tourism GDP contribution	0.5***	1.672711***	0.6***	1.826822***
	(0.2)	(.2741112)	(0.2)	(.3467149)
Constant	−3.9**	.0204553**	−2.4	.0917921
	(1.9)	(.0379543)	(1.8)	(.166748)
Observations	191		191	
AIC	204.592		200.982	
BIC	256.629		259.523	
LR Test	(df = 15) = 87.136 p-value = 0.000		(df = 17) = 94.747 p-value = 0.000	
Pseudo R^2	0.3355		0.3648	

Notes: Standard errors in parentheses ***p < 0.01, **p < 0.05, *p < 0.1.

As the results suggest by looking at the tourism variables (*Nights of stays* and *Tourism GDP contribution*) regions that are already tourism destination are more likely to prioritise tourism as their S3 strategy. Unfortunately, at this stage, we cannot distinguish to what extent

tourism as priority is chosen to pursue complementarity or diversification (i.e. intra-industry or inter-industry strategy; [37].

5.1. Robustness checks

As robustness checks, we have developed two alternatives. First, we have reproduced the analysis using a probit model estimation based on the "standard normal" distribution rather than the "logistic" distribution. Table 4 shows that the obtained findings for the variables under interest are consistent with previous ones. The results of the variables *QoG_Low*Lagging* and *Tourism GDP* confirm to be the most significant drivers. Overall, as Table 5 reports, the two models are very similar, and this is also confirmed by the weak difference between AICs and BICs. In terms of goodness of fit, the McFadden's pseudo R-squared suggests in both specifications and for both models estimated present a very good model fit.

Secondly, we have implemented a different structure for the explanatory variables system. We are re-estimated the model by excluding regions registered in 2013, and the results did not change. We also re-estimated by excluding regions registered in both 2013 and 2014, but given the small number of observations, the model did not converge.[4]

The base category of the dummies Mostly Intermediate and Mostly Rural is Mostly Urban; the base category of the dummies Catching-up, Keeping pace and Diverging is Frontier Regions; the base category of the dummies More Developed and Transition is Less Developed; the base category of the dummies Innovation Leaders, Innovation Strong and Innovation Moderate is Innovation Modest.

Table 4
Robustness check: Probit regression results.

Model	1	2
Dependent variable	Regional Tourism Priority	Regional Tourism Priority
Geographical and demographic variables		
Population density	−0.0003	−0.0003
	(0.0003)	(0.0003)
Islands	1.3*	1.3*
	(0.7)	(0.7)
Regional capital	1.8**	1.5*
	(0.9)	(0.9)
Mostly Intermediate	0.2	0.1
	(0.3)	(0.3)
Mostly Rural	0.1	−0.003
	(0.3)	(0.3)
Economic variables		
GDP per capita	−0.00006*	−0.00007**
	(0.00003)	(0.00003)
Catching-up (Labour productivity)	1.7**	1.5*
	(0.8)	(0.8)
Keeping pace (Labour productivity)	1.0	0.7
	(0.8)	(0.8)
Diverging (Labour productivity)	1.0	0.9
	(0.8)	(0.8)
More Developed regions	0.4	0.8
	(0.6)	(0.6)
Transition regions	−1.0*	−0.6
	(0.5)	(0.5)
Innovation leaders (RIS)		0.5
		(0.7)
Innovation Strong (RIS)		−0.5
		(0.6)
Innovation Moderate (RIS)		−0.03
		(0.5)
Regional Innovation Scoreboard (RIS)	0.007	
	(0.007)	
Institutional variables		
QoG_Low*Lagging	1.4***	1.3***
	(0.4)	(0.4)
Tourism variables		
Nights of stay per capita	0.00003*	0.00004*
	(0.00002)	(0.00002)
Tourism GDP contribution	0.3***	0.3***
	(0.09)	(0.1)
Constant	−2.3**	−1.5
	(1.1)	(1.1)
Observations	191	191
AIC	204.057	201.228
BIC	256.093	259.769
LR Test	LR (df = 15) = 87.672 p-value = 0.000	LR (df = 17) = 94.501 p-value = 0.000
Pseudo R^2	0.3376	0.3638

Notes: Standard errors in parentheses ***p < 0.01, **p < 0.05, *p < 0.1.
The base category of the dummies Mostly Intermediate and Mostly Rural is Mostly Urban; the base category of the dummies Catching-up, Keeping pace and Diverging is Frontier Regions; the base category of the dummies More Developed and Transition is Less Developed; the base category of the dummies Innovation Leaders, Innovation Strong and Innovation Moderate is Innovation Modest.

Table 5
Comparison between logit and probit.

	Model 1		Model 2	
	Logit	Probit	Logit	Probit
Logit	1.0000		1.0000	
Probit	0.9996*	1.0000	0.9989*	1.0000

Note: * specifies that the correlation coefficients are significant at the 5% level or lower.

5.2. Cluster analysis

Finally, to better identify sub-groups of regions with similar characteristics, a cluster analysis is applied to the 89 regions that chose tourism as a priority. As relevant variables, we use some of geographical, economic, institutional and tourism explanatory variables that are found to be statistically significant in the previous empirical model. They are: *islands, regional capital, GDP* per capita*, lagging regions, quality of government, nights of stay* per capita*, tourism GDP contribution.* We also add *regional innovation scoreboard*.

Results of the K-mean cluster, by using Euclidean distance algorithm and by setting 4 groups are the most reliable. In terms of the number of regions included in each group, we set a minimum threshold of 10% (i.e. at least 8 regions in each group). Due to some missing values, the cluster analysis takes into consideration in a total of 80 regions. Table 6 shows the variables analysed for the four groups.[5]

Cluster 1 – Lagging regions with a low level of tourism flows. This cluster includes regions located in Poland, Romania and Greece that record a low level of GDP per capita as well as a low level of institutional quality and innovation capacity.

Cluster 2 – Tourism regions. This cluster contains a low number of regions, where the level of tourism flows is very high. Five out of ten are islands with a GDP per capita medium-high. These regions are located, on average, in countries where the tourism GDP contribution is the higher (Greece, Italy, Spain).

Cluster 3 – Lagging regions with a developed tourism sector. Regions belonging to this cluster are characterised by a medium-low level of GDP per capita, but with a developed tourism sector and a high tourism GDP contribution at the national level. Four out of twenty-five are islands.

Cluster 4 – Capital and regions with high GDP per capita. In this cluster are grouped all regions that host the capital of the country. The cluster includes also regions with high GDP per capita, high innovation score and good quality of government. However, they are located in countries

[4] Results are available under request.

[5] For a complete list of regions included in each cluster see Table 3A in the Appendix.

Table 6
Regions clusters description (means).

Variables	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Islands	0	0.5	0.2	0.1
Regional capital	0	0	0	0.2
GDP per capita	13,000.0	27,270.0	18,676.0	30,776.7
Lagging regions	0.8	0.4	0.6	0
QoG	−1.1	−0.0	−0.5	0.6
Nights of stay per capita	1804.6	46,413.5	5056.7	6627.7
Tourism GDP contribution	3.0	5.2	4.9	2.9
Regional Innovation Scoreboard	45.3	72.5	68.1	113.8
Total regions	15	10	25	30
Countries (number of regions)	Poland (6) Romania (5) Greece (4)	Greece (3) Spain (2) Italy (2) Austria (2) Portugal (1)	Spain (7) Greece (5) Italy (5) Portugal (5) France (2) Germany (1)	Germany (8) Italy (5) Greece (4) Spain (4) Denmark (3) Sweden (3) France (2) Finland (2) Netherland (1) Portugal (1)

where, on average, the GDP contribution due to tourism is very low.

Overall, the cluster analysis gives some first hints on the direction of the diversification (complementarity). For instance, *cluster 2* includes the more tourism regions in the sample but are only 10 out of 80 regions: Algarve, Canary Islands, Balearic Islands, Ionian Islands, Crete, Southern Aegean, Bolzano, Trento, Salzburg, Tirol. This can be considered as an indirect indicator of using tourism sector as a way to diversify the economies for the majority of non-tourist regions. This might confirm that for the majority of regions, tourism is prioritised as a complementary activity.

6. Conclusions

The present work analyses information gathered by the Eye@RIS3 application to investigate the characteristics of regions that chose tourism as a strategic priority in the context of the Smart Specialisation policy and to understand the determinants of choice. Accurately, we test two hypotheses: first, prioritising tourism is a rational choice given the characteristics of the regions; second, regions well interpreted the aim of the policy of using this specific program as an economic diversification strategy.

Results show that tourism is considered as a priority for a large number of EU regions and that these regions have not homogeneous characteristics. Tourism is the strategic choice of already developed tourism destinations as well as regions with no tourism specialisation. The underlined rationale behind their choice does not emerge. As a further development of research, it would be interesting to investigate the specific regional strategic programs and also to check whether proper local actions and investments follow those programs. Therefore, no specific relationship emerges between tourism concentration and the choice of tourism as a priority. This result is in line with the general aim of SS as a tool for diversifying local economies. At this stage of the analysis was not possible to precisely disentangle whether regions are focusing more on specialisation or diversification. However, the cluster analysis gives some first hints on the direction of the diversification; *cluster 2* is the cluster with the more tourism regions in the sample but includes 10 out of 80 regions only. This indirectly indicates that the majority of non-tourist regions are considering this sector as a way to diversify their economies and as a complementary activity to other economic sectors.

The determinants/characteristics of regions choosing tourism as a priority are: to be islands and capital of regions (G); to have a lower GDP per capita and to be catching-up (E); to have a low quality of government and to be lagging regions (I); to be a tourism destination (Nights of stays) and to belong to a tourism country (Tourism GDP contribution).

A recent analysis demonstrates how low institutional quality in European lagging regions does not represent a substantial handicap for future development [42]. The voluntary registration at the RIS3 might indeed improve the quality of government since the required promotion of transparency and accountability can reduce corruption that is a common problem of regions with low quality of government. Moreover, when the quality of government increases, innovation increases accordingly, and this might be even more evident in peripheral than in core regions. For these reasons, the success of the smart specialisation strategies is likely also for regions that chose tourism as a priority. However, since the specific characteristics of the tourism sector and the academic debate about the role of the sector for economic growth and local well-being, these results open up ground for further discussions.

The limits of the present paper are threefold. The first one is linked to the Eye@RIS3 application, which is the primary source of the analysis. The EU Commission might not approve the chosen priorities, therefore they might change accordingly. The second one relates to the dependent variable used in the present paper that measures a declaration of intent rather than the actual investments in technological innovation in tourism and specifically in smart tourism. The third one relays to tackle the very crucial issue of diversification properly. A further development of this work could go in these three directions: 1) to analyse some case studies to understand if the chosen priorities have been actually implemented; 2) when data will be available, to use as dependent variable a measure of funds invested in smart tourism and innovations in the tourism sector; 3) to deeper investigate the diversification issue and the conditions under which tourism sector can be considered the right strategy in the long run. The first two directions would allow us to examine the actual coherence of the regions between intentions and actions.

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CRediT authorship contribution statement

Bianca Biagi: Conceptualization, Methodology, Validation, Writing - original draft, Writing - review & editing. **Maria Giovanna Brandano:** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing, Visualization. **Raquel Ortega-Argiles:** Conceptualization, Supervision, Writing - review & editing.

Appendix

Table 1A
Top ten of NUTS-2 regions in tourism specialisation.

	Tourism demand (Arrivals)	Tourism demand (Nights)	Tourism supply (Accommodation)	Tourism supply (Bed)	Location quotient 1	Location quotient 2
1	Île de France	**Canary Islands**	Adriatic Croatia	Adriatic Croatia	Åland Islands	Inner London West
2	**Catalonia**	Île de France	Veneto	**Catalonia**	Inner London West	Aquitaine
3	**Andalusia**	**Catalonia**	**Tuscany**	Veneto	Aquitaine	Corsica
4	**Côte d'Azur**	**Balearic Islands**	**Bolzano**	**Côte d'Azur**	Corsica	**Ionian Islands**
5	**Rhône-Alpes**	Adriatic Croatia	**Lazio**	**Rhône-Alpes**	**Ionian Islands**	**Algarve**
6	Veneto	Veneto	**Emilia-Romagna**	**Toscana**	Bratislava Region	**Southern Aegean**
7	**Upper Bavaria**	**Côte d'Azur**	**Southern Aegean**	Languedoc-Roussillon	**Algarve**	**Bolzano**
8	Lombardy	**Andalusia**	Lombardy	Aquitaine	**Southern Aegean**	Prague
9	**Tuscany**	**Rhône-Alpes**	West Wales and The Valleys	**Andalusia**	**Bolzano**	**Balearic Islands**
10	**Canary Islands**	**Tuscany**	**Tyrol**	**Balearic Islands**	**Rhône-Alpes**	City of Brussels
	70%	60%	60%	60%	50%	50%

Note: in bold regions that chose tourism in Eye@RIS3.
LQ1 = Location Quotient computed by using transports, accommodation, food and beverage, rental, travel agencies and tour operators' services.
LQ2 = Location Quotient 2 computed by using HORECA services (Hotel, Restaurants and Catering).

Table 2A
NUTSt-2 regions that chose tourism in Eye@RIS3, overnights per 1000 inhabitants above the EU average.

	Region	Country
1	Southern Aegean	Greece
2	Balearic Islands	Spain
3	Bolzano	Italy
4	Ionian Islands	Greece
5	Tyrol	Austria
6	Canary Islands	Spain
7	Salzburg	Austria
8	Algarve	Portugal
9	Crete	Greece
10	Trentino	Italy
11	Madeira	Portugal
12	Valle d'Aosta	Italy
13	Malta	Malta
14	Cyprus	Cyprus
15	Tuscany	Italy
16	Côte d'Azur	France
17	Northern Aegean	Greece

Table 3A
List of regions included in clusters.

Cluster 1	Cluster 2	Cluster 3	Cluster 4
1. Anatoliki Makedonia, Thraki	1. Ionian Islands	1. Brandenburg	1. Hovedstaden
2. Thessaly	2. Southern Aegean	2. Kentriki Makedonia	2. Midtjylland
3. Ipeiros	3. Crete	3. Dytiki Makedonia	3. Nordjylland
4. Dytiki Ellada	4. Balearic Islands	4. Sterea Ellada	4. Upper Bavaria
5. Podkarpackie	5. Canary Islands	5. Peloponnesus	5. Lower Bavaria
6. Swietokrzyskie	6. Bolzano	6. Northern Aegean	6. Oberpfalz
7. Podlaskie	7. Trentino	7. Galicia	7. Oberfranken
8. Lubuskie	8. Salzburg	8. Cantabria	8. Mittelfranken
9. Kujawsko-Pomorskie	9. Tyrol	9. Castilla-La Mancha	9. Unterfranken
10. Warminsko-Mazurskie	10. Algarve	10. Extremadura	10. Schwaben
11. Centru		11. Valencian Community	11. Berlin
12. Nord-Est		12. Andalusia	12. Attica
13. Sud-Est		13. Region of Murcia	13. Navarre
14. Sud - Muntenia		14. Centre	14. La Rioja
15. Sud-Vest Oltenia		15. Bretagne	15. Aragón
		16. Campania	16. Catalonia
		17. Apulia	17. Rhône-Alpes
		18. Calabria	18. Côte d'Azur
		19. Sicily	19. Valle d'Aosta
		20. Sardinia	20. Friuli-Venezia Giulia
		21. Norte	21. Emilia-Romagna
		22. Centro (PT)	22. Tuscany
		23. Alentejo	23. Lazio
		24. Azores	24. Friesland (NL)
		25. Madeira	25. Lisboa
			26. Etelä-Suomi

(*continued on next page*)

Table 3A (*continued*)

Cluster 1	Cluster 2	Cluster 3	Cluster 4
			27. Pohjois-ja-Itä-Suomi 28. Småland med öarna 29. Västsverige 30. Mellersta Norrland

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