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## Mapping post crises the European job growth in travel agencies and tour operator reservation services

Adriana Grigorescu<sup>a</sup> , Cristina Lincaru<sup>b</sup>, Speranta Pirciog<sup>b</sup> and Razvan-Ion Chitescu<sup>a</sup>

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### ABSTRACT

World Tourism Organisation, declares the Tour Operators as tourism engine of strategic importance to support jobs and inclusive growth in all regions. Tour operators emerges following the 2008 crises, as a global job engine. Its atypical profile of highest human capital concentrator in tourism, attract and retain talents, works digital with a high-intensity information use. Is a rapid adopter of technological innovation, generate high value added in highly competitive global markets.

We look in this paper to understand why employment is growing or declining in a regional tourism tour operator sector during 2008–2018, in some EU28 regions? We use Exploratory Spatial Data Analysis to map the indicator ‘tour operator’s employment growth’ components decomposed by the Shift Share Analysis Method. Analysed Eurostat data for 266 regions (281 regions) indicates that for the average regional tour operators employment growth heterogeneity is driven almost at half by region-specific factors. The main contributions are: identifying this indicator as appropriate to be a core one in OECD (2013) tourism competitiveness framework & redefine tour operator sector as a core sector of tourism in the Global model of tourism of Harrison.

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## Introduction

In the last two decades, tourism become the world’s largest industry (Xin, 2015), acting globally it brings together ‘regions, tourists, business suppliers, economies, governments, communities and environments’. Tourism industry and traveling according to Turner (2018) creates jobs, contributes substantially to prosperity and global development. Tribe (1997) and Bhatia (2007) defined the tourism industry structure as being made from producers (carriers, accommodation and man-made attractions) and support service suppliers (private or public). Tour operators and travel agents are

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classified as mainly tourism industry by EUROSTAT and codified N79.<sup>1</sup> Both categories have similar objective to create value for tourists.

Tour operators plays, recently the main role in maximise customer value and gain a competitive advantage in the global markets. Also, tourists, tour operators, and service suppliers' frames a complete tourism supply chain. Shang-Yu Liu and Wei-Shuo Lo (2016) and Dupeyras and MacCallum (2013) link the operator's presence with enhancing country competitiveness. Tour operators sector account 668.8 thousand persons employed in 2018, increasing with 70.8 thousand in the same period, having a growth of 11.8%, 4.6 higher than the total employment growing rate.

Tour operators sector is the highest human capital concentrator among all tourist industries. It attracts and retains talents, tertiary share in employment is 47.6%, classified as Knowledge Intensive Activities (KIA, over 33%). This sector is a fast integrator of technological innovation OECD (2007)<sup>2</sup> classified by intensity of technology and knowledge usage as a Less Knowledge-Intensive Market Services (LKIMS). That means this sector share the KIS sectors characteristics: generate high value added (over 21% according to OECD 2007), have a high-intensity information use, based on ICT and digitisation adoption working in highly competitive markets. Tour operators, as KIS, presents a multidimensional profile: (i) knowledge – generate and exploit; (ii) innovation and (iii) spatial proximity/regional dimension (Muller & Doloreux, 2007). Also, is an innovation creator not only an innovation adopter (Bryson & Daniels, 2007, p.179). At the same time, it acts as a highly gender inclusive sector, women share is 63% from total employment (Eurostat, 2019).<sup>3</sup>

On the background that 'Europe continues to stand as the most visited region, welcoming half of the world's international tourist arrivals',<sup>4</sup> World Tourism Organisation (UNWTO, 2018) declares the Tour Operators as tourism engine of strategically importance to support jobs and inclusive growth in all regions.

Spain's case, the global tourism leader, open the debates in regard the relationship between tourism and economic growth, when high shocks acts (i.e. 2008 Global Financial and Economic Crisis, the Arab Spring) (Perles-Ribes et al., 2017).

Dupeyras and MacCallum (2013) creates a framework for comparative measurement of competitiveness in tourism and iterates as research gap the assessment of ability of a destination to deliver quality and competitive tourism services through employment growth. Other gaps highlighted by the literature are: assessing the structure of the tourism sector; the structure of tourism supply chains; and the use of e-tourism, innovative services, social media, etc.

The gap we are addressing by our study is the competitiveness of tourism industry through employment growth using a multi-perspective spatial analysis of the tourism potential in EU in 28 countries at NUTS2 level for N79 (the national change effect, industrial mix effect, and regional competitiveness effect).

Starting from Moretti's (2012) conclusion that the agglomerations of high human capital predict the success of locations and provide a multiplier effect, we selected the indicator 'Employment growth in tour operators sector, in a region in a time period' as a tool to measure the destination ability to generate competitive tourism services through employment growth.

Research question: What regions in EU, during 2008–2018, registered employment growth tourism industry (N79) and where is located a high potential of his sector?

Our research topic informs about the key theoretical perspective of global tourism competitiveness in the development paradigm. The key theoretical perspective is that talents changes the tourism structure adopting in a accelerate manner the digital transformation opportunities, increasing competitiveness of destination region. The global tourism paradox is that mass tourism push pressure for a tourist region, regardless development level, to be competitively at global scale. The optimal tourism structure is a mainly spatial analysis object.

This study introduction presents the tour operators broader framework, employment growth effect for tourism industry. Literature review looks for tourism theory and tourism operators, tourism competitiveness for a destination and tourism operator's regional employment growth. The methodology is a mix of standardised methods: Exploratory Spatial Data Analysis (ESDA) as a tool for map the tour operator's employment growth components at regional level, decomposed by the Shift Share Analysis (SSA)'s (National Share, Industrial Mix Share and Competitive Effect). Results and discussions picture the maps and details for regions with competitive advantage, relative specialisation and high endogenous effect on tour operator's employment growth. Paper ends with the findings of the study, highlighting the theoretical and practical contributions and the limitations of the methods and indicators used in this study. Moreover, we articulate further developments in research development and guidelines for policy makers.

## Literature review

### *Tourism theory and tourism operators*

Cukier (2006) recently consecrate tourism as an academic discipline and the tourism complexity needs interdisciplinary approach in its study (Tribe, 1997). According to Jennings (2006) 'epistemologies and hegemony no longer represent an accountable tourism research agenda in a twenty-first century world of flux and unpredictability', while Xin (2015) bring in the conceptual inquiry. Stergiou and Airey (2018) conclude that the elusive and eclectic character of tourism theory make it difficult to delineate, reflecting its immaturity. Ritchie et al. (2008) conceptualises the Core-foundational Model of Tourism as a result of interpretation of the interface between Tourism Theory and its Foundation Disciplines, emphasising its highly disciplinary pluralism. The economic and management stream brings the richest theoretical contributions and according to Stergiou and Airey (2018) Smart Tourism emerges as new research field. Ye et al. (2020) points, on the context of 5G technology adoption, that 'the prevalence of Internet of Things (IoT), mobile applications (apps), location-based services, geo-tag services, Virtual Reality (VR), Augmented Reality (AR), social media, and smart devices offers immense opportunities for tourism stakeholders to generate, store, and retrieve big data that serve various purposes'.

Tour operators could be reflected by the area of event tourism as field of study and area of professional practice of planned events (Getz & Page, 2016). Tour

operators as KIS, should evolve towards ‘tour information service support system, core agents for smart tourism’ (Li et al., 2017).

Harrison (2015) distinguish the Global model of tourism political economy that incorporates both developed and developing societies, under the development theory paradigm. Sharpley (2009) identifies the evolution of Development Theory from 1950s in the following process stages: Modernisation theory (MT), MT& dependency theory, Neoliberalism, Alternative development, Sustainable development, Post-development and the demand for a New Paradigm.

### ***Tourism competitiveness for a destination***

One topic representative for tourism management perspective is the destination competitiveness. OECD build in 2013 a shared definition of tourism competitiveness for a destination: ‘is about the ability of the place to optimise its attractiveness for residents and non-residents, to deliver quality, innovative, and attractive (e.g. providing good value for money) tourism services to consumers and to gain market shares on the domestic and global market places, while ensuring that the available resources supporting tourism are used efficiently and in a sustainable way’ (Dupeyras & MacCallum, 2013).

Salinas-Fernández et al. (2020) show that ‘tourism destination competitiveness is a multidimensional concept that is widely studied in the academic literature’, but difficult to measure. Travel & Tourism Competitiveness Index, is the most popular compound index designed by World Economic forum since 2007, Guaita-Martinez et al. (2019) are proposing a new methodology for TTCI to classify the 136 country.

Dupeyras and MacCallum (2013) identifies two practical approaches: strong chains as potential for development or weakness in chains to improve competitiveness.

In 2013 the 31 OECD members and partner countries creates the Framework for comparative measurement of competitiveness in tourism (Dupeyras & MacCallum, 2013). The Framework comprises three types of indicator that can be applied to measure competitiveness in tourism – 11 core indicators, 5 supplementary indicators and 4 for future development indicators. The ‘Employment in tourism by age, education levels and type of contracts’ is an additional non-core indicators. This indicator measures ‘Assessment of Ability of a destination to deliver quality and competitive tourism services through employment growth’. Interpretation is seen as ‘a measure that would assess ability to attract, retain and develop talent in the industry to enable improved competitiveness’ (Dupeyras & MacCallum, 2013).

### ***Tourism operators employment growth and regional competitiveness***

The growth performance difference of the relative to national average is explained by Classical Shift Share Analysis (SSA) as the result its economic structure and/or the growing rate of its sectors. Sentz (2011) describes SSA as ‘a standard regional analysis method that attempts to determine how much of regional job growth can be attributed to national trends and how much is due to unique regional factors’. Its research question is: Why employment is growing or declining in a regional industry, cluster,

or occupation? According to Lailani (2014) SSA is a relative simple analysis ‘especially useful for understanding what is happening in an industry that is growing locally but declining nationally (or the reverse)’. SSA and Local Quotient Techniques (LQT) are used also in tandem to analysis the behaviour of regional economies. Munawir (2014) identify through SSA the Bandung sectors with a competitive advantage when compared to West-Java and Indonesia. Prats and Ramirez (2018) asses using SSA the levels of efficiency in the regional structure in the state of Tabasco from 2003 to 2013.

Fuchs et al. (2000) make with SSA the Asian regions profile by the relative competitive advantage in tourism. Yasin et al. (2004) apply SSA to characterise the Portuguese tourism industry in the context of the challenges and opportunities of the global tourism.

Dogru and Sirakaya-Turk (2017) improved the SSA method with the Shift-share regression for measuring the tourism industry’s performance in a South Carolina in the USA. Shi et al. (2007) in Jiangsu Province and Firgo and Fritz (2017) in Australia applies a spatially extended SSA and a modified dynamic shift-share model to analyse the spatial competitiveness of international tourism in in comparison with its neighbours. Traistaru and Wolff (2002) apply SSA on employment data at county level, counting 89 regions for Bulgaria, Hungary and Romania for the period 1990–1999. Their results confirm that the regional employment growth heterogeneity is driven almost entirely by region-specific factors, while the industry mix and regional competitiveness factors play only a minor role.

Capello and Fratesi (2011) evidenced that the degree of participation of the local economy dimension next to the presence of mega cities is a measure of the degree of integration of a local economy in a global economy. Artige and Neuss (2013) compare the two growth effects of a geographical unit with those of any other geographical unit without defining a reference territory, eliminating the flaws identified by Dunn (2005) and Esteban-Marquillas (1972).

You et al. (2010) apply the spatial expansion model with SSA to the six provinces of central China. Authors concludes that ‘if the competition component difference is positive, it indicates that the neighbourhoods increase the competitiveness of that industry, if not, it means that it hinders the enhancement of the competitiveness of the industry, and so on’. Goschin (2014) emphasise for Romania that that the developed regions recovers more easily from the crisis due to their economic potential, but appropriate regional policies are requested. Zaman et al. (2015) show that tour operators employment growth could support the sustainable regional growth in the sense endogenous development.

## Methodology

Classical SSA, is an old and ease of use method to study regional growth patterns. Was developed by Creamer since 1942 and formalised by Fuchs (1962) and Ashby (1964). Buck (1970) examines empirically the usefulness of shift and share analysis as applied to regional employment growth.

Herzog and Olsen (1977) points about the Problem of ‘Weights’ and The Problem of ‘Interwoven Effects’ of the SSA. The SSA in the Problem of ‘Weights’ do not take into

account the ‘changes in regional industrial structure over the analysis period’ (Dunn, 2005; Fuchs, 1959; Klaassen & Paelinck, 1972) and for The Problem of ‘Interwoven Effects of regional structure determines the magnitude of both the *industry-mix* and *competitive effects*, therefore the *competitive advantage/disadvantage is relative*’.

Casler (1989) propose a theoretical context for SSA, based on standard microeconomic theory. Graham Shaw and Spence (1998) recommends modifications to the labour demand SSM, including input price and technological growth effects.

Argues among the advantages of deterministic SSM is the result to Blien et al. (2014) recommend dynamic SSA to show the structural effect. O’Leary and Webber (2015) apply for 181 European regions from 1980 to 2007 dynamic SSA shows the ‘importance of structural change for growth and convergence’.

Esteban-Marquillas (1972) redefines the competitive position and creates a fourth shift-share component, the ‘allocation effect’.

### Shift share equations

In 1992 Selting and Loveridge defines the ‘SSM as a method of decomposing employment patterns into expected (share) and differential (shift) components’. In this context, Selting and Loveridge (1992) uses SSM for analysing: (a) spatial heterogeneities at national level and at regional level; (b) examining lateral variations in growth (the case of two regions with similar economic structure but with different growth performance); (c) the one industry performance levels differentiated by region. SSM, decompose the regional change in employment growth during a period of time, in the following effects (or components): *the national growth effect, the industrial mix effect, and the competitive effect*:

$$\Delta E_{ij} = E_{ij}^t - E_{ij}^{t-1} = NE_{ij} + IM_{ij} + CE_{ij} \quad (1)$$

E = employment level

i = the number of **sectors** or industries in a region or nation (i = 1,2, ... s)

j = the number of **regions** in an geographical area (j = 1,2, ... r)

$E_{ij}$  = employment in the  $i^{\text{th}}$  sector in the  $j^{\text{th}}$  region

$\Delta E_{ij}$  = Change in Employment in a certain industry (i) from the region (j) during [t-1:t] period

$E_{ij}^t$  = Employment in a certain industry (i) in the (j) region at the time (t)

$NE_{ij}$  = Change due to National Trends; National Growth Effect

$IM_{ij}$  = Change due to Industrial Mix; Industrial Mix Effect

$CE_{ij}$  = Change due to Regional shift or **Competitive Effect**

### National share

The national growth effect is the ‘amount that total regional employment would have grown if it grew at precisely the same rate as total employment in the nation as a whole’ (Stilwell, 1969, p.163). Implicitly, the model asserts that the industries in a region will grow at approximately the rate of national industries unless the region has a comparative

advantage or disadvantage (Bishop & Simpson, 1972; Knudsen & Barff, 1991; Loveridge 1995; Selting & Loveridge, 1992, p.4)

$$NSi = E_{ij}^{t-1} * (e_{00}) = E_{ij}^{t-1} * \frac{E_{00}^t - E_{00}^{t-1}}{E_{00}^{t-1}} \quad (2)$$

$E_{ij}^{t-1}$  = Employment in the region in that industry in the first year [t-1];

$(e_{00})$  = the percentage change in nationwide employment; National employment growth rate in [t-1: t] period

$E_{00}^{t-1}$  = total national employment  $\sum_i^s \sum_j^r E_{ij}^{t-1}$  at initial moment t-1

$E_{00}^t$  = total national employment  $\sum_i^s \sum_j^r E_{ij}^t$  at final moment t

### Industrial mix share

Regions differ by their economic structure and performance. Each region could be characterised by a sectorial pattern with different combinations of slow-growing sectors and specialised in sectors with high growth rates, both relative to the national average. In SSA the Industry Mix Effect dimension describes the regional variations in industrial composition. Selting and Loveridge (1992) defines the industry mix as ‘the amount of growth attributable to differences in the sectorial makeup of the region versus that of the nation. The summation of the industry mix over each of the industries in the region,  $IM_o$ , provides a total industry mix effect for all sectors in the region. A positive total industry mix implies the region is **specialized** in industries that, nationally, are experiencing greater growth than the overall national average. A negative total industry mix means that a region has higher than average proportions of people employed in industries that are sluggish relative to the average growth of all national industries’.

$$IMi = E_{ij}^{t-1} * (e_{i0} - e_{00}) = E_{ij}^{t-1} * \left( \frac{E_{i0}^t - E_{i0}^{t-1}}{E_{i0}^{t-1}} - \frac{E_{00}^t - E_{00}^{t-1}}{E_{00}^{t-1}} \right) \quad (3)$$

$e_{i0}$  = the percentage change in nationwide employment for industry i

$E_{i0}^{t-1}$  = national employment in the  $i^{\text{th}}$  industry  $\sum_j^r E_{ij}^{t-1}$  at initial moment t-1

$E_{i0}^t$  = national employment in the  $i^{\text{th}}$  industry  $\sum_j^r E_{ij}^t$  at final moment t

### Regional shift (Or local share)/competitive effect

‘If industry i in region j grows at anything other than the sum of the national growth effect and the industry mix (i.e. the region’s share), the residual is ascribed to the competitive effect. The competitive effect as a “shift” from what would be expected if the region’s industry grew at exactly the proportion of national growth and industry mix’ (Selting & Loveridge, 1992). The ‘implicit in shift-share analysis is the assumption that regional economies should grow at national growth rates unless there are comparative advantages or disadvantages operating at the regional level’ (Bishop and Simpson, 1972). In the classical SSA, is considered that ‘A positive competitive effect means that a region’s industry is growing faster than the national average industry growth rate and



a negative competitive effect implies that a region's industrial growth is lagging behind national industries manufacturing the same products' (Stevens and Moore, 1980, cited by Selting & Loveridge, 1992). The growth attributed to the competitive effect is the value that is left after the national growth effect and industry mix are subtracted. This residual is inferred to result from factors that are unique to the region. The competitive effect arises 'from interregional differences affecting a given area's attractiveness to the activity' (James and Hughes, 1973, p.223). These differences are developed because of endogenous factors inherent to the region (Dawson, 1982). The competitive effect can be thought of as a measurement of a region's competitive edge or comparative advantage in the production of the goods in the  $i^{\text{th}}$  industry.

*While the shift-share competitive effect describes whether regional conditions favour or discourage growth, it does not provide answers as to why a strongly positive shift exists in one region but not in another. Reasons for differential growth arise from an amalgam of factors, which may include different levels of resource endowments, multiplier effects, agglomeration economies, or policy measures such as low business taxes or high investments in human capital formation. By itself, shift-share cannot ferret out which factors are at work in various regions.* (Selting & Loveridge, 1992, p.4)

$$CE_{ij} = E_{ij}^{t-1} * (e_{ij} - e_{i0}) = E_{ij}^{t-1} * \left( \frac{E_{ij}^t - E_{ij}^{t-1}}{E_{ij}^{t-1}} - \frac{E_{i0}^t - E_{i0}^{t-1}}{E_{i0}^{t-1}} \right) \quad (4)$$

$e_{ij}$  = the percentage of change in employment in industry  $i$ , region  $j$  relative to a base year

While the shift share competitive effect is known also as Endogenous versus Exogenous Growth Differentiation a definition from which shift-share derives part of its name is that of the regional share. The sum of the national growth effect and the industry mix ( $NE_{0j} + IM_{0j}$ ) are together called the 'region's proportion or share of growth'. Both, the national growth effect and the industry mix effect, are exogenous factors that are determined by national growth rates, not local or regional economic conditions. Together, they comprise the region's expected growth, or the growth that would occur in the region if each of the industries grew at the same rate as the nation as a whole (Selting & Loveridge, 1992).

### **Exploratory spatial data analysis (ESDA)**

From the ESDA techniques we use the Choropleth Maps which represents 'Counterpart of Histogram, where are values/attributes for discrete spatial units with associate colours palette (Anselin, 2002). The maps uses geocoded data and we represents the variables using 5 classes Natural Breaks (Jenks) Classification. This classification technique is an optimisation method for Choropleth Maps, minimises variation in each group, applied in Arc GIS desktop 9.3. This method allows identifying clusters where data values are 'placed into a single class. Class breaks occur where there is a gap between clusters'. In this case, 'data is unevenly distributed; that is, many features have the same or similar values and there are gaps between groups of values' (ArcGIS 9.2. Desktop Help, 2008).

## Data collection

Tour operators (N79) are fully included in the Eurostat (2019) lately selection of NACE Rev.2 classes, at 4 digits. Eurostat methodology<sup>5</sup> reports in 2016 over 13.36 million persons employed in the EU28 tourism industries, from which 521.34 thousand persons *in tour operators' sector*. Employment in tourism industries is concentrated, more than 2/3 in top five countries: Germany, United Kingdom, Spain, Italy and France. Tour operator's employment is 3.9% in total employment for Spain and France, share equal with the EU28 mean. This share is over the EU28 mean in Germany (4.2%) and United Kingdom (4%) and below in Italy (3.2%).

Employment data used to apply SSA standard at national level for each EU28 countries are provided by Eurostat: at national level [lfsa\_egan2] and at regional (NUTS2)<sup>6</sup> level for 266 from a total of 281 regions [sbs\_r\_nuts06\_r2]. General time frame is 2008–2016.

## Results and discussions

The classical SSA has some limits: cannot explain whether changes in employment are significant, economic structure dynamics effect is ignored, the absence of tests of the evaluations, etc. Also, economic growth is difficult to measure directly, changes in the level of regional employment (in our case) have become accepted surrogates for economic growth.

Our results are reliable as consistency or repeatability by the Eurostat indicator, fully comparable across time and space, used in the methodology.

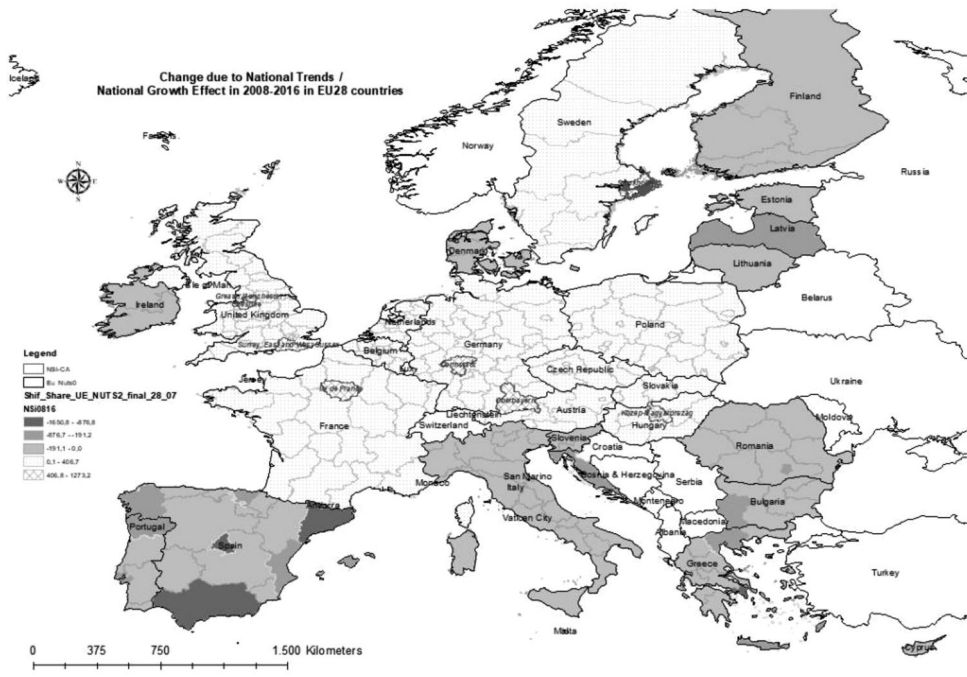
**National Growth Effect** in EU28 during 2008–2016 period points that 173 regions from 12 countries present positive national share of tour operator's employment. The [Figure 1](#) illustrate the National Share component of N79 employment, calculated independently by each country, applying ESDA technique. These regions have a comparative advantage provided by studied sector, compared to all other economic sectors and present a Centre-Periphery pattern, across EU28 map.

[Table 1](#) indicate that the regions with competitive advantage in tour operators are clustered in countries with 80% total regions with this characteristic. Regions with competitive advantage in tour operators sector covers in average 61.1% from total regions at EU28 level.

In [Table 2](#) are presented the selected regions by countries with N79 regional employment positive modification, higher than 406 employees, during 2008–2016 period, in EU28. These are the EU 28's regions with competitive advantage a best employment performance [employed persons] with a threshold given by Jenks classification ESDA method. The map result is in line with (You et al., 2010) neighbourhood pattern – the best performance in employment growth regions are surrounded by regions with relative advantage in N79 employment relative to nationwide employment.

Frankfurt, Paris, London, Budapest, Stockholm, Köln – metropolis are at the heart of these regions, tendency in line with (WTTC, 2019).

Industrial mix present in [Figure 2](#) the 144 regions that are relatively specialised in tour operators sector that, nationally, are experiencing greater growth than the overall



**Figure 1.** Employment change in N79 due to National Trends; National Growth Effect in EU28 during 2008–2016 period at NUTS 2 level. Source: Map made by authors, ESRI SHAPE file.

**Table 1.** Number of regions by countries with regional employment growth in N79 higher than total growth employment rate during 2008–2016 in EU28: number of regions with competitive advantage in the N79 sector [number of regions].

	Nuts0	NSI0816 > 0 (FILTER)	Total NUTS2 regions at the country level	Share of regions with comparative advantage provided by N79 in total number of regions
1	GB	37	37	100.0
2	NL	12	12	100.0
3	BE	11	11	100.0
4	AT	9	9	100.0
5	CZ	8	8	100.0
6	SE	8	8	100.0
7	SK	4	4	100.0
8	MT	1	1	100.0
9	DE	38	39	97.4
10	PL	16	17	94.1
11	HU	7	8	87.5
12	FR	22	27	81.5
	Total	173	281	61.6

Source: Eurostat data, table results calculated by authors.

national average. In Table 3 are presented the 14 countries which presents the shares of regions specialised in N79 over 66%, while the average share at EU28 is 51.2%.

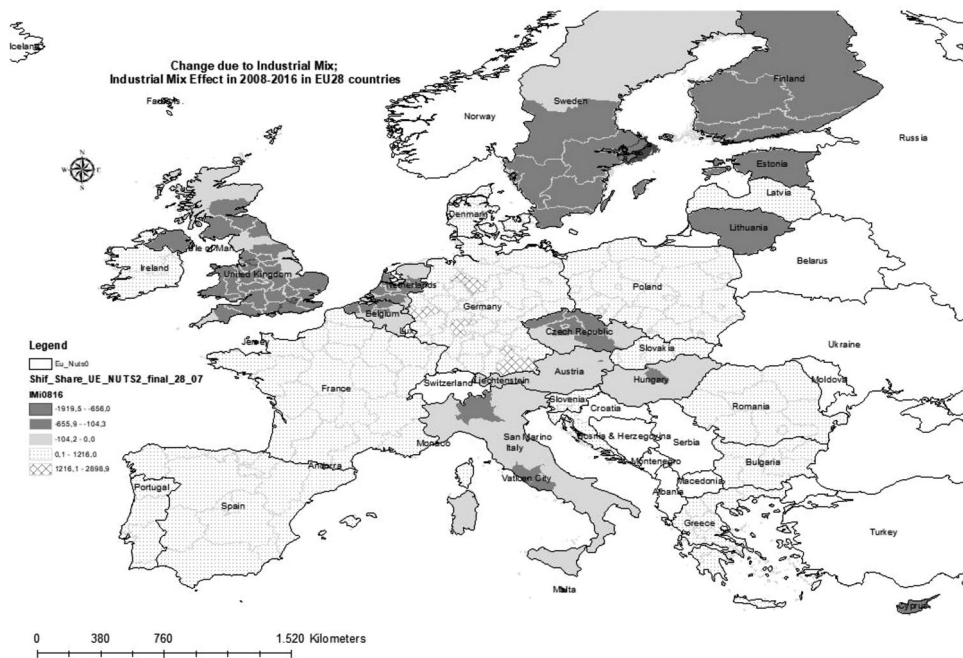
Figure 2 reveals one spatial pattern base on relative contiguity,<sup>7</sup> from South West to North (Portugal, Spain, France, Germany and Poland) and down to South East (Poland, Slovenia, Romania, Bulgaria, Macedonia and Greece) in a U revers shape. In this pattern is connected also Denmark and Latvia, Ireland is an ‘island’ in terms of

**Table 2.** Selected regions by countries with N79 regional employment positive modification, higher than 406 employees, during 2008–2016 period, in EU28: the regions with competitive advantage a best employment performance [employed persons].

Nuts 0	Nuts2	Region Name	NSI0816
DE	DE71	Darmstadt	763
	DE21	Oberbayern	475
	DEA2	Köln	407
FR	FR10	Île-de-France	579
	GB	UK11	Inner London
UK12		Outer London	636
UKJ2		Surrey, East and West Sussex	589
UKD3		Greater Manchester	486
HU	HU10	Central Hungary (Közép-Magyarország)	605
MT	MT00	Malta	615
SE	SE11	Stockholm	459
Total	11		

Source: Eurostat data, table results calculated by authors.

Notes: DE71: Darmstadt is one of the three Regierungsbezirke of Hesse, Germany, located in the south of the state. Frankfurt (Main). This region includes the independent cities: Darmstadt, Frankfurt (Main), Offenbach and Wiesbaden; DE21: Upper Bavaria, Kreisfreie Städte (district-free cities): Ingolstadt, Munich (München), Rosenheim; DEA2 District-free towns; Aachen, Bonn, Cologne, Leverkusen; FR10Paris Region; HU10 Budapest.



**Figure 2.** Employment change in N79 due to Industrial Mix; Industrial Mix Effect in EU28 during 2008–2016 period at NUTS 2 level.

Source: Map made by authors, ESRI SHAPE file.

specialisation. The Specialisation effect is spread in a pattern of U reverse shape, indicating a contiguity & connectivity effect presence. High degree of specialisation indicate involvement in globalisation (Capello & Fratesi, 2011).

In Table 4 are presented the 5 selected regions by countries with a positive total industry mix effect higher than 1216 employees. These are the EU 28's regions with

**Table 3.** Number of regions by countries specialised in N79 during 2008–2016 in EU28 [number of regions].

Nuts 0	Number of regions specialised in N79, IMi0816 > 0 (FILTER)	Total NUTs2 regions in the country	Share of regions specialised in N79
ES	19	19	100.0
GR	13	13	100.0
RO	8	8	100.0
PT	7	7	100.0
BG	6	6	100.0
DK	5	5	100.0
SK	4	4	100.0
SI	2	2	100.0
LV	1	1	100.0
DE	38	39	97.4
PL	16	17	94.1
FR	22	27	81.5
IE	2	3	66.7
Total (266)	144	281	51.2

Source: Eurostat data, table results calculated by authors.

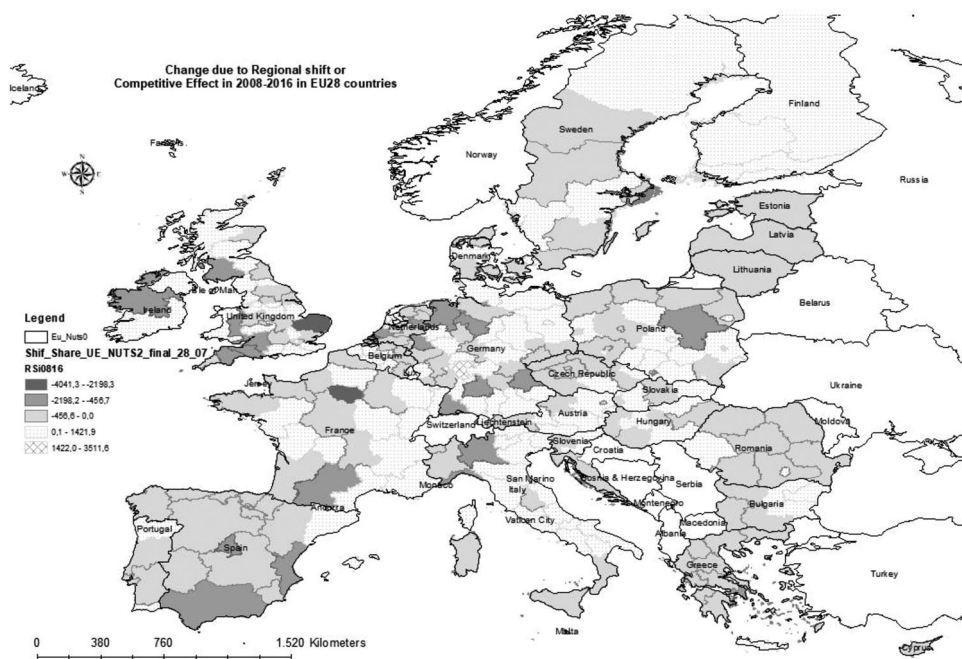
**Table 4.** Selected regions by countries with a positive total industry mix effect higher than 1216 employees in N79 at NUTs 2 level, during 2008–2016 period, in EU28. The amount of growth regarded as being caused by the differences in sectoral employment in N79 and the employment growth at national level. [Employed persons].

Nuts0	No	Nuts2	Region Name	IMi0816 > 1216 (FILTER)
DE	1	DE71	Darmstadt	2899
	2	DE21	Oberbayern	1804
	3	DEA2	Köln	1544
	4	DE92	Hannover	1448
	5	DEA1	Düsseldorf	1216
GR	1	EL30	Attiki	1907
Total	N	5	5	5

Source: Eurostat data, table results calculated by authors.

relative specialisation in tour operator's profile, providing the best employment performance [employed persons] with a threshold given by Jenks classification ESDA method. Among the 5 leading regions 4 are from Germany, again Darmstadt on the first place and one is from Greece, Attiki having the second rank by employment growth. Frankfurt, the geographical centre of EU enlarged, 'is an alpha world city and a global hub for commerce, culture, education, tourism and transportation', major city from Darmstadt. Also, Attiki have Athens as capital, a capital with a Smart Specialisation Platform.<sup>8</sup>

Figure 3 present the 116 regions that have a positive competitive effect, respectively high endogenous growth effect, experiencing greater growth than the overall national average. The tour operator's employment in these regions grows faster than the sector employment at national average growth rate. This local growth rate is specific for the region. (Table 5) Supplementary we add the last overall rankings in 2019 and rank change since 2017 of the Travel & Tourism Competitiveness Index (TTCI). Calderwood et al. (2019) Our results are convergent with TTCI ranking for the best performer. There are 4 countries (United Kingdom, Germany, Italy and France, exception for Spain) from the top 5 TTCI rank, with large numbers of regions (over 12) that have high endogenous growth effect for Employment growth in tour operators. But all these countries keep their



**Figure 3.** Employment change in N79 due to Regional shift or Competitive Effect in EU28 during 2008–2016 period at NUTS 2 level.

Source: Map made by authors, ESRI SHAPE file.

rank in 2017 compared to 2019 (exception for United Kingdom that lose on place). In terms of progress of increasing competitiveness, among studied countries, Romania reached the highest score positive modification of 12 during 2017–2019 for TTCI driven by 2 regions. Denmark increases its rank with 10 places in 2 regions from total 5 regions. Slovenia (in 1 region from 2) and Finland (in all its 5 regions) also increases their rank with 5 places. Our indicator offers complementary information's, at regional level for TTCI, allowing deep insights. Among best performers, Italy proves to be more competitive in 13 regions from its 21 regions with a regional coverage of 61.9%, closed followed by United Kingdom with 51.4% endogenous regional coverage. Finland, Austria, Belgium and Slovenia, are small countries with high coverage of endogenous competitive effect, with coverage also higher than 50% from all regions.

Among the 21 countries with selected 116 regions there are 11 countries counting 96 regions presents a Share of regions with positive competitive effect provided by N79 higher than EU28 average of 40% (Table 6).

Regional conditions favour in the highest level employment growth in Darmstadt and Nord-Holland hosting mega cities like Frankfurt and Amsterdam working as Global Hubs (Harrison, 2015). Here the employment increases in the mentioned period with over 3225 person. Regions with a good competitive effect (second class in Figure 2) could improve the tour operator's sector performance more if connect to the Global Hubs. Germany proves to be highly global connected and with the highest number of regions competitive endogenous for tour operators growth performance.

**Table 5.** Number of regions in which the N79 has a positive competitive effect – the employment in the N79 in these regions grows faster than the employment in the N79 sector at national average growth rate: the growth is given by the specific of the region [number of regions].

NUTS0 ISO_2DIGIT (1)	Number of regions with positive competitive effect provided by N79 RSi0816 > 0 (2)	Total NUTS2 regions in the country (3)	Share of regions with positive competitive effect provided by N79 (4)	Travel & Tourism Competitiveness Index (TTCI)	
				2019 TTCI Overall Rankings (5)	Rank Change since 2017 (6)
FI	5	5	100.0	28	5
AT	6	9	66.7	11	1
IT	13	21	61.9	8	0
BE	6	11	54.5	24	-3
GB	19	37	51.4	6	-1
BG	3	6	50.0	45	0
SK	2	4	50.0	60	-1
SI	1	2	50.0	36	5
PL	8	17	47.1	42	4
DE	18	39	46.2	3	0
FR	12	27	44.4	2	0
PT	3	7	42.9	12	2
DK	2	5	40.0	21	10
HU	3	8	37.5	48	1
SE	3	8	37.5	22	-2
IE	1	3	33.3	26	-3
ES	5	19	26.3	1	0
CZ	2	8	25.0	38	1
RO	2	8	25.0	56	12
NL	1	12	8.3	15	2
GR	1	13	7.7	25	-1
Total (266)	116	281	41.3		

Source: (1) to (4) Eurostat data, table results calculated by authors; (5) and (6) from (Calderwood et al. 2019, p.xiii) rank from 140 economies WEF at NUT0 level. Values for all other EU28 countries: Croatia (5, 27), Estonia (46, -9), Latvia (1, 53), Malta (1, 35), Cyprus (44,+8), Luxembourg (23, +5), Lithuania (59, -3).

**Table 6.** Selected regions by countries with a positive competitive effect higher than 1422 employees in N79 at NUTS 2 level, during 2016–2018 period, in EU28. Regions where the N79 employment is growing faster than the national average industry growth rate. [Employed persons].

Nuts0	Nuts2	Region Name	RSi0816 > 1422
DE	DE71	Darmstadt	3512
NL	NL32	Noord-Holland	3225

Source: Eurostat data, table results calculated by authors.

Figure 3 indicates a randomised spatial profile of competitive effect, the region specific conditions to support tour operator's employment growth, with small clusters national and cross border. This result is similar with Batista e Silva et al. (2018) spatiotemporal patterns of tourism in Europe at high-resolution with conventional and big data sources.

Some of the results are simply snap shots that confirms the tourism megatrends announced by (WTTC, 2019) 'today's hyper-connected world, power and demographic shifts from West to East and nations to cities'.

## Conclusion

In EU28 (266 from a total of 281 regions) during 2008–2016 period, the over 40% of the average regional tour operators employment growth heterogeneity is driven

almost by region-specific factors. This finding is in line with Traistaru and Wolff (2002)'s conclusion, at smaller scale. Following You et al. (2010), these 116 regions with a positive competitive component increases the competitiveness of tour operators sector as well as tourism industry.

Our main contribution is the decomposing with SSA of the Employment growth in tour operator's sector analysis at regional level during 2008–2016 period. This indicator is highly relevant for:

- a. Theory: tour operator sector is a core sector of tourism in the Global model of tourism announced by Harrison (2015). It plays the role of the 'brain' for the smart tourism (Stergiou & Airey, 2018), is not support service but creator for tourism products;
- b. Practice: the identification of a core indicator appropriate for OECD (2013) tourism competitiveness framework.

This indicator allow deep analysis for endogenous competitive regions capacity to attract and retain talents, *e-tourism and other innovative services proxy measure, insights regarding the structure of tourism supply chains, on innovation and use of social media in the tourism industry* (Dupeyras & MacCallum, 2013) and a measure of industry thickness dynamics, clusters and competitiveness, existing/potential. Supplementary, we provide details regarding the spatial structure of agglomerations and clusters identified at regional level. Regions with high rates of tour operators indicates the Jacobian externalities agglomeration (Jacobs, 1961, 1969), acting as regional knowledge spill overs in a region, the variety of sectors are related or unrelated (Frenken et al., 2007). The Morettian Human capital spill over effect is tremendous important for education policy, for new talents attraction in the region (Moretti, 2004).

In short, the tour operator presence agglomeration increases the resilience of the hosted region and their cities.

Methodological limitations – SSA does not indicate why these industries are competitive, merely shows the sectors in which the region is outcompeting or under competing the nation (Sentz, 2011), considering that *the competitive advantage is relative* (Dunn, 2005; Fuchs, 1959; Klaassen & Paelinck, 1972).

Data and indicator limitations – Seasonality. Monthly frequency will be an improvement; activity structure of tour operators; employment contract type; county level are additional variables to be considered.

Further developments in research development in the field of tour operators are: the speed of digital transformation adoption assessment to fully beneficiate of the opportunities; platform employment (gig economy) from tourism impact on job creation; optimal tourism sector structure at the best spatial granularity; effects of global connectivity in networks and Global Hubs, relationship with smart cities for EU tourism network management.

The results of the present study offers guidelines for policy makers:

- The map of regions with effect on tour operators competitiveness as input for tourism policy and entrepreneurship development;



- Locations and inputs for priorities Human capital, active, investments in digital infrastructure policies;
- Benchmarking of EU28 the regions by endogenous Competitive Effect on tour operators employment growth;

The growth of employment in tour operators sector is an indicator that allow to provide diverse and deeper insight, useful for tourism understanding and practice improvement.

Our results goes beyond the ‘common sense’ of the touristic countries. Some of the results are simply snap shots that confirms the tourism megatrends announced by (WTTC, 2019) ‘today’s hyper-connected world, power and demographic shifts from West to East and nations to cities are redefining centres of influence and reshaping global markets, while individuals increasingly mobilise and demand accountability’.

## Notes

1. [https://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism\\_industries\\_-\\_employment#Data\\_sources](https://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism_industries_-_employment#Data_sources)
2. OECD Science, Technology and Industry Scoreboard 2007, p2 10
3. Eurostat, 2018. Tourism industries – employment. Statistics Explained <https://ec.europa.eu/eurostat/statistics-explained/pdfscache/46236.pdf>
4. European Union Tourism Trends, <https://www.e-unwto.org/doi/pdf/10.18111/9789284419470>
5. [https://ec.europa.eu/eurostat/statistics-explained/images/3/3f/Number\\_of\\_persons\\_employed%2C\\_by\\_economic\\_activity%2C\\_2016.png](https://ec.europa.eu/eurostat/statistics-explained/images/3/3f/Number_of_persons_employed%2C_by_economic_activity%2C_2016.png)
6. **Nomenclature of Territorial Units for Statistics (NUTS)**.[https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Nomenclature\\_of\\_territorial\\_units\\_for\\_statistics\\_\(NUTS\)](https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Nomenclature_of_territorial_units_for_statistics_(NUTS))
7. Between Slovenia and Romania is a discontinuity, but in terms of distance is below 100 km. on the background of entire EU map we consider this situation as relative contiguity.
8. <https://s3platform.jrc.ec.europa.eu/regions/EL30/tags/EL30>

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**Annex 1. NUTS 2 regions with data in other years than the reference interval 2008 and 2016.**

time interval			time interval				
1	DE40	Brandenburg	2011-2016	55	FR83	Corse (NUTS 2013)	2010-2013
2	DE41	Brandenburg - Nordost (NUTS 2006)	2008-2010	56	HR	Croatia	2014-2016
3	DE42	Brandenburg - Südwest (NUTS 2006)	2008-2010	57	HR03	Jadranska Hrvatska	2014-2016
4	DED1	Chemnitz (NUTS 2006)	2008-2010	58	HR04	Kontinentalna Hrvatska	2014-2016
5	DED3	Leipzig (NUTS 2006)	2008-2010	59	HU10	Közép-Magyarország (NUTS 2013)	2008-2015
6	DED4	Chemnitz	2011-2016	60	IE01	Border, Midland and Western (NUTS 2013)	2008-2015
7	DED5	Leipzig	2011-2016	61	IE02	Southern and Eastern (NUTS 2013)	2008-2015
8	EL11	Anatoliki Makedonia, Thraki (NUTS 2010)	2008-2012	62	ITC2	Valle d'Aosta/Vallée d'Aoste	2009-2016
9	EL12	Kentriki Makedonia (NUTS 2010)	2008-2012	63	ITC3	Liguria	2009-2016
10	EL13	Dytiki Makedonia (NUTS 2010)	2008-2012	64	ITD1	Provincia Autonoma Bolzano/Bozen (NUTS 2006)	2008-2010
11	EL14	Thessalia (NUTS 2010)	2008-2012	65	ITD2	Provincia Autonoma Trento (NUTS 2006)	2008-2010
12	EL21	Ipeiros (NUTS 2010)	2008-2011	66	ITD3	Veneto (NUTS 2006)	2008-2010
13	EL22	Ionia Nisia (NUTS 2010)	2008-2012	67	ITD4	Friuli-Venezia Giulia (NUTS 2006)	2008-2010
14	EL23	Dytiki Ellada (NUTS 2010)	2008-2011	68	ITD5	Emilia-Romagna (NUTS 2006)	2008-2010
15	EL24	Stereia Ellada (NUTS 2010)	2008-2011	69	ITE1	Toscana (NUTS 2006)	2008-2010
16	EL25	Peloponnisos (NUTS 2010)	2008-2012	70	ITE2	Umbria (NUTS 2006)	2008-2010
17	EL51	Anatoliki Makedonia, Thraki	2013-2016	71	ITE3	Marche (NUTS 2006)	2008-2010
18	EL52	Kentriki Makedonia	2013-2016	72	ITE4	Lazio (NUTS 2006)	2008-2010
19	EL53	Dytiki Makedonia	2013-2016	73	ITH1	Provincia Autonoma di Bolzano/Bozen	2011-2016
20	EL54	Ipeiros	2013-2016	74	ITH2	Provincia Autonoma di Trento	2011-2016
21	EL61	Thessalia	2013-2016	75	ITH3	Veneto	2011-2016
22	EL62	Ionia Nisia	2013-2016	76	ITH4	Friuli-Venezia Giulia	2011-2016
23	EL63	Dytiki Ellada	2013-2016	77	ITH5	Emilia-Romagna	2011-2016
24	EL64	Stereia Ellada	2013-2016	78	IT11	Toscana	2011-2016
25	EL65	Peloponnisos	2013-2016	79	IT12	Umbria	2011-2016
26	FI13	Itä-Suomi (NUTS 2006)	2008-2010	80	IT13	Marche	2011-2016
27	FI18	Etelä-Suomi (NUTS 2006)	2008-2010	81	IT14	Lazio	2011-2016
28	FI1A	Pohjois-Suomi (NUTS 2006)	2008-2010	82	LU	Luxembourg	no data
29	FI1B	Helsinki-Uusimaa	2010-2016	83	MT	Malta	2008-2015
30	FI1C	Etelä-Suomi	2010-2016	84	NL13	Drenthe	2009-2016
31	FI1D	Pohjois- ja Itä-Suomi	2010-2014	85	NL23	Flevoland	2009-2016
32	FI20	Åland	2008-2014	86	PL11	Łódzkie (NUTS 2013)	2008-2015
33	FR	France	2010-2016	87	PL12	Mazowieckie (NUTS 2013)	2008-2015
34	FR10	Île de France	2010-2016	88	PL31	Lubelskie (NUTS 2013)	2008-2015
35	FR21	Champagne-Ardenne (NUTS 2013)	2010-2015	89	PL32	Podkarpackie (NUTS 2013)	2008-2015
36	FR22	Picardie (NUTS 2013)	2010-2015	90	PL33	Świętokrzyskie (NUTS 2013)	2008-2015
37	FR23	Haute-Normandie (NUTS 2013)	2010-2015	91	PL34	Podlaskie (NUTS 2013)	2008-2015
38	FR24	Centre (FR) (NUTS 2013)	2010-2015	92	SI01	Vzhodna Slovenija (NUTS 2010)	2008-2012
39	FR25	Basse-Normandie (NUTS 2013)	2010-2015	93	SI02	Zahodna Slovenija (NUTS 2010)	2008-2012
40	FR26	Bourgogne (NUTS 2013)	2010-2015	94	SI03	Vzhodna Slovenija	2013-2016
41	FR30	Nord - Pas-de-Calais (NUTS 2013)	2014-2016	95	SI04	Zahodna Slovenija	2013-2016
42	FR41	Lorraine (NUTS 2013)	2010-2015	96	UKD2	Cheshire (NUTS 2006)	2008-2010
43	FR42	Alsace (NUTS 2013)	2010-2015	97	UKD5	Merseyside (NUTS 2006)	2008-2010
44	FR43	Franche-Comté (NUTS 2013)	2010-2015	98	UKD6	Cheshire	2011-2016
45	FR51	Pays de la Loire (NUTS 2013)	2010-2015	99	UKD7	Merseyside	2011-2016
46	FR52	Bretagne (NUTS 2013)	2010-2015	100	UKI1	Inner London (NUTS 2010)	2008-2012
47	FR53	Poitou-Charentes (NUTS 2013)	2010-2015	101	UKI2	Outer London (NUTS 2010)	2008-2012
48	FR61	Aquitaine (NUTS 2013)	2012-2015	102	UKI3	Inner London - West	2013-2016
49	FR62	Midi-Pyrénées (NUTS 2013)	2010-2015	103	UKI4	Inner London - East	2013-2016
50	FR63	Limousin (NUTS 2013)	2012-2015	104	UKI5	Outer London - East and North East	2013-2016
51	FR71	Rhône-Alpes (NUTS 2013)	2010-2015	105	UKI6	Outer London - South	2013-2016
52	FR72	Auvergne (NUTS 2013)	2010-2015	106	UKI7	Outer London - West and North West	2013-2016
53	FR81	Languedoc-Roussillon (NUTS 2013)	2010-2013	107	UKM2	Eastern Scotland (NUTS 2013)	2008-2015
54	FR82	Provence-Alpes-Côte d'Azur (NUTS 2013)	2010-2014	108	UKM3	South Western Scotland (NUTS 2013)	2008-2015

**Annex 2. National Share of N79 employment EU countries profiles at NUTS 2 level.**

NUTS 0	No	NUTS 2	NSi0816 > 0 (FILTER)	
			Name	NSi0816
AT	1	AT13	Wien	229
	2	AT33	Tirol	91
	3	AT31	Ober+Ästerreich	86
	4	AT12	Nieder+Ästerreich	64
	5	AT32	Salzburg	60
	6	AT22	Steiermark	57
	7	AT21	K+Ärnten	37
	8	AT34	Vorarlberg	25
	9	AT11	Burgenland	8
	Total	9		
BE	1	BE10	Brussels Hoofdstedelijk Gewest	80
	2	BE21	Provincie Antwerpen	57
	3	BE23	Provincie Oost-Vlaanderen	43
	4	BE24	Provincie Vlaams-Brabant	33
	5	BE25	Provincie West-Vlaanderen	24
	6	BE22	Provincie Limburg	17
	7	BE33	Provincie Luik	16
	8	BE32	Provincie Henegouwen	13
	9	BE31	Provincie Waals-Brabant	7
	10	BE34	Provincie Luxemburg	7
	11	BE35	Provincie Namen	6
	Total	11		
CZ	1	CZ01	Prague	165
	2	CZ06	Jihovýchod (Southeast)	67
	3	CZ05	Severovýchod (Northeast)	27
	4	CZ02	Střední Čechy (Central Bohemia)	27
	5	CZ04	Severozápad (Northwest)	26
	6	CZ03	Jihozápad	23
	7	CZ08	Moravskoslezsko (Moravian-Silesian)	21
	8	CZ07	Severovýchod (Northeast)	16
	Total	8		
DE	1	DE71	Darmstadt	763
	2	DE21	Oberbayern	475
	3	DEA2	Köln	407
	4	DE92	Hannover	381
	5	DEA1	Düsseldorf	320
	6	DE60	Hamburg	235
	7	DE11	Stuttgart	222
	8	DE50	Bremen	213
	9	DEA3	Münster	212
	10	DE30	Berlin	210
	11	DE13	Freiburg	175
	12	DE94	Weser-Ems	160
	13	DEA5	Arnsberg	148
	14	DEF0	Schleswig-Holstein	126
	15	DE12	Karlsruhe	117
	16	DED2	Dresden	111
	17	DE25	Mittelfranken	106
	18	DEB1	Koblenz	91
	19	DEB3	Rheinessen-Pfalz	70
	20	DED4	Chemnitz	69
	21	DED5	Leipzig	69
	22	DE40	Brandenburg	69
	23	DE23	Oberpfalz	66
	24	DE93	Lüneburg	63
	25	DEA4	Detmold	62
	26	DE22	Niederbayern	61
	27	DEG0	Thüringen	60
	28	DEE0	Sachsen-Anhalt	58
	29	DE26	Unterfranken	57

*(continued)*

**Annex 2.** Continued.

NUTS 0	No	NUTS 2	NSi0816 > 0 (FILTER)	NSi0816
			Name	
	30	DE91	Braunschweig	50
	31	DE24	Oberfranken	49
	32	DE80	Mecklenburg-Vorpommern	49
	33	DE14	Tübingen	47
	34	DE27	Schwaben	46
	35	DECO	Saarland	43
	36	DE73	Kassel	43
	37	DE72	Gießen	41
	38	DEB2	Trier	17
	Total	38		
FR	1	FR10	Île-de-France	579
	2	FR71	Rhône-Alpes	71
	3	FR82	Provence-Alpes-Côte d'Azur	60
	4	FR62	Midi-Pyrénées	54
	5	FR52	Bretagne	30
	6	FR51	Pays de la Loire	26
	7	FR61	Aquitaine	23
	8	FR30	Nord - Pas-de-Calais	21
	9	FR81	Languedoc-Roussillon	17
	10	FR24	Centre	15
	11	FR25	Basse-Normandie	13
	12	FR42	Alsace	12
	13	FR41	Lorraine	11
	14	FR23	Haute-Normandie	10
	15	FR53	Poitou-Charentes	9
	16	FR26	Bourgogne	9
	17	FR21	Champagne-Ardenne	7
	18	FR83	Corse	7
	19	FR72	Auvergne	6
	20	FR22	Picardie	4
	21	FR43	Franche-Comté <sup>®</sup>	2
	22	FR63	Limousin	2
	Total	22		
GB	1	UKI1	Inner London	1273
	2	UKI2	Outer London	636
	3	UKJ2	Surrey, East and West Sussex	589
	4	UKD3	Greater Manchester	486
	5	UKH1	East Anglia	376
	6	UKM3	South Western Scotland	267
	7	UKM2	Eastern Scotland	238
	8	UKJ4	Kent	237
	9	UKH2	Bedfordshire and Hertfordshire	235
	10	UKE4	West Yorkshire	231
	11	UKJ1	Berkshire, Buckinghamshire and Oxfordshire	228
	12	UKK1	Gloucestershire, Wiltshire and Bristol/Bath area	211
	13	UKD4	Lancashire	202
	14	UKJ3	Hampshire and Isle of Wight	179
	15	UKG3	West Midlands	177
	16	UKF2	Leicestershire, Rutland and Northamptonshire	168
	17	UKH3	Essex	157
	18	UKK2	Dorset and Somerset	143
	19	UKF1	Derbyshire and Nottinghamshire	142
	20	UKC2	Northumberland and Tyne and Wear	133
	21	UKG2	Shropshire and Staffordshire	119
	22	UKD6	Cheshire	109
	23	UKL2	East Wales	106
	24	UKK4	Devon	104
	25	UKE2	North Yorkshire	102
	26	UKG1	Herefordshire, Worcestershire and Warwickshire	101
	27	UKE3	South Yorkshire	96

*(continued)*

**Annex 2.** Continued.

NUTS 0	No	NUTS 2	NSi0816 > 0 (FILTER)	NSi0816
			Name	
	28	UKL1	West Wales and The Valleys	84
	29	UKN0	Northern Ireland	81
	30	UKD7	Merseyside	75
	31	UKM5	North Eastern Scotland	61
	32	UKE1	East Yorkshire and Northern Lincolnshire	56
	33	UKD1	Cumbria	47
	34	UKC1	Tees Valley and Durham	47
	35	UKM6	Highlands and Islands	44
	36	UKK3	Cornwall and Isles of Scilly	40
	37	UKF3	Lincolnshire	29
	Total	37		
HU	1	HU10	Central Hungary (Közép-Magyarország)	605
	2	HU21	Central Transdanubia (Közép-Dunántúl)	46
	3	HU22	Western Transdanubia (Nyugat-Dunántúl)	55
	4	HU23	Southern Transdanubia (Dél-Dunántúl)	59
	5	HU31	Northern Hungary (Észak-Magyarország)	33
	6	HU32	Northern Great Plain (Észak-Alföld)	39
	7	HU33	Southern Great Plain (Dél-Alföld)	45
	Total	7		
MT	1	MT00	Malta	615
	Total	1		
NL	1	NL32	Noord-Holland	47
	2	NL33	Zuid-Holland	33
	3	NL41	Noord-Brabant	15
	4	NL21	Overijssel	12
	5	NL22	Gelderland	12
	6	NL31	Utrecht	10
	7	NL42	Limburg (NL)	6
	8	NL11	Groningen	4
	9	NL12	Friesland (NL)	3
	10	NL34	Zeeland	3
	11	NL13	Drenthe	2
	12	NL23	Flevoland	2
	Total	12		
PL	1	PL12	Mazowieckie	144
	2	PL21	Małopolskie	65
	3	PL22	Śląskie	58
	4	PL51	Dolnośląskie	40
	5	PL41	Wielkopolskie	33
	6	PL63	Pomorskie	32
	7	PL42	Zachodniopomorskie	26
	8	PL11	Łódzkie	22
	9	PL62	Warmińsko-Mazurskie	15
	10	PL32	Podkarpackie	12
	11	PL52	Opolskie	11
	12	PL34	Podlaskie	11
	13	PL61	Kujawsko-Pomorskie	10
	14	PL31	Lubelskie	9
	15	PL43	Lubuskie	6
	16	PL33	Świętokrzyskie	6
	Total	16		
SE	1	SE11	Stockholm	459
	2	SE23	West Sweden (Västsverige)	142
	3	SE22	South Sweden (Sydsverige)	114
	4	SE12	East Middle Sweden (Östra Mellansverige)	72
	5	SE21	Småland and the islands (Småland med öarna)	49
	6	SE31	North Middle Sweden (Norra Mellansverige)	40
	7	SE33	Upper Norrland (Övre Norrland)	36
	8	SE32	Mellersta Norrland	28
	Total	8		

*(continued)*



**Annex 2.** Continued.

NUTS 0	No	NUTS 2	NSi0816 > 0 (FILTER)	NSi0816
			Name	
SK	1	SK01	Bratislava Region	24
	2	SK02	Western Slovakia (Západné Slovensko)	10
	3	SK04	Central Slovakia (Stredné Slovensko)	8
	4	SK03	Eastern Slovakia (Východné Slovensko)	7
	Total	4		
Total	N	173		

**Annex 3.** Industrial Mix Share over N79 employment EU countries profiles at NUTS 2 level.

		nuts	Name	IMi0816 > 0 (FILTER)
BG	1	BG41	Yugozapaden	719
	2	BG33	Severoztochen	218
	3	BG42	Yuzhen tsentralen	117
	4	BG34	Yugoiztochen	113
	5	BG32	Severen tsentralen	39
	6	BG31	Severozapaden	18
	Total	6		
DE	1	DE71	Darmstadt	2899
	2	DE21	Oberbayern	1804
	3	DEA2	Köln	1544
	4	DE92	Hannover	1448
	5	DEA1	Düsseldorf	1216
	6	DE60	Hamburg	890
	7	DE11	Stuttgart	841
	8	DE50	Bremen	809
	9	DEA3	Münster	804
	10	DE30	Berlin	799
	11	DE13	Freiburg	665
	12	DE94	Weser-Ems	609
	13	DEA5	Arnsberg	561
	14	DEF0	Schleswig-Holstein	479
	15	DE12	Karlsruhe	443
	16	DED2	Dresden	422
	17	DE25	Mittelfranken	404
	18	DEB1	Koblenz	346
	19	DEB3	Rheinessen-Pfalz	267
	20	DED4	Chemnitz	262
	21	DED5	Leipzig	260
	22	DE40	Brandenburg	260
	23	DE23	Oberpfalz	251
	24	DE93	Lüneburg	239
	25	DEA4	Detmold	237
	26	DE22	Niederbayern	233
	27	DEG0	Thüringen	229
	28	DEE0	Sachsen-Anhalt	219
	29	DE26	Unterfranken	215
	30	DE91	Braunschweig	191
	31	DE24	Oberfranken	186
	32	DE80	Mecklenburg-Vorpommern	186
	33	DE14	Tübingen	180
	34	DE27	Schwaben	174
	35	DECO	Saarland	164
	36	DE73	Kassel	163
	37	DE72	Gießen	154
	38	DEB2	Trier	66
	Total	38		
DK	1	DK01	Hovedstaden	94

*(continued)*

## Annex 3. Continued.

		nuts	Name	IMI0816 > 0 (FILTER)
	2	DK04	Midtjylland	39
	3	DK03	Syddanmark	23
	4	DK05	Nordjylland	16
	5	DK02	Sjælland	7
	Total	5		
ES	1	ES30	Comunidad de Madrid	110
	2	ES51	Catalonia	73
	3	ES61	Andalusia	58
	4	ES53	Illes Balears	36
	5	ES70	Canarias	31
	6	ES52	Comunidad Valenciana	29
	7	ES21	Basque Community	17
	8	ES11	Galicia	14
	9	ES41	Castile-Leon	11
	10	ES24	Aragon	9
	11	ES42	Castilla-La Mancha	7
	12	ES12	Principado de Asturias	6
	13	ES62	Region of Murcia	5
	14	ES13	Cantabria	4
	15	ES22	Comunidad Foral de Navarra	4
	16	ES43	Extremadura	4
	17	ES23	La Rioja	2
	18	ES63	Ciudad Autonoma de Ceuta	1
	19	ES64	Ciudad Autonoma de Melilla	0
	Total	19		
FR	1	FR10	Île-de-France	1037
	2	FR71	Rhône-Alpes	127
	3	FR82	Provence-Alpes-Côte d'Azur	107
	4	FR62	Midi-Pyrénées	96
	5	FR52	Bretagne	54
	6	FR51	Pays de la Loire	46
	7	FR61	Aquitaine	42
	8	FR30	Nord - Pas-de-Calais	38
	9	FR81	Languedoc-Roussillon	31
	10	FR24	Centre	26
	11	FR25	Basse-Normandie	23
	12	FR42	Alsace	21
	13	FR41	Lorraine	20
	14	FR23	Haute-Normandie	19
	15	FR53	Poitou-Charentes	17
	16	FR26	Bourgogne	16
	17	FR21	Champagne-Ardenne	13
	18	FR83	Corse	12
	19	FR72	Auvergne	10
	20	FR22	Picardie	8
	21	FR43	Franche-Comte	4
	22	FR63	Limousin	3
	Total	22		
GR	1	EL30	Attiki	1907
	2	EL42	Notio Aigaio	479
	3	EL43	Kriti	399
	4	EL12	Kentriki Makedonia	387
	5	EL22	Ionia Nisia	248
	6	EL25	Peloponnisos	99
	7	EL11	Anatoliki Makedonia, Thraki	97
	8	EL14	Thessalia	93
	9	EL23	Dytiki Ellada	83
	10	EL41	Voreio Aigaio	74
	11	EL21	Ipeiros	59
	12	EL24	Stereia Ellada	50
	13	EL13	Dytiki Makedonia	25

(continued)

**Annex 3. Continued.**

		nuts	Name	IMI0816 > 0 (FILTER)
	Total	13		
HR	1	HR03	Jadranska Hrvatska	1060
	Total	1		
IE	1	IE02	Southern and Eastern	252
	2	IE01	Border, Midland and Western	27
	Total			
LV	1	LV00	Latvia	545
	Total	1		
PL	1	PL12	Mazowieckie	347
	2	PL21	Małopolskie	157
	3	PL22	Śląskie	139
	4	PL51	Dolnośląskie	97
	5	PL41	Wielkopolskie	79
	6	PL63	Pomorskie	76
	7	PL42	Zachodniopomorskie	62
	8	PL11	Łódzkie	54
	9	PL62	Warmińsko-Mazurskie	36
	10	PL32	Podkarpackie	29
	11	PL52	Opolskie	27
	12	PL34	Podlaskie	26
	13	PL61	Kujawsko-Pomorskie	25
	14	PL31	Lubelskie	21
	15	PL43	Łubuskie	16
	16	PL33	Świętokrzyskie	15
	Total	16		
PT	1	PT17	Lisboa	890
	2	PT11	Norte	448
	3	PT15	Algarve	241
	4	PT16	Centro	206
	5	PT30	Região Autónoma da Madeira	152
	6	PT20	Região Autónoma dos Açores	57
	7	PT18	Alentejo	46
	Total	7		
RO	1	RO32	Bucuresti - Ilfov	457
	2	RO12	Centru	123
	3	RO22	Sud-Est	103
	4	RO11	Nord-Vest	100
	5	RO31	Sud - Muntenia	81
	6	RO21	Nord-Est	76
	7	RO42	Vest	75
	8	RO41	Sud-Vest Oltenia	46
	Total	8		
SI	1	SI02	Zahodna Slovenija	190
	2	SI01	Vzhodna Slovenija	131
	Total	2		
SK	1	SK01	Bratislava Region	514
	2	SK02	Western Slovakia (Západné Slovensko)	224
	3	SK04	Central Slovakia (Stredné Slovensko)	175
	4	SK03	Eastern Slovakia (Východné Slovensko)	157
	Total	4		
Total	N	144		

**Annex 4.** Regional Shift (Or Local Share)/Competitive Effect of N79 employment EU countries profiles at NUTS 2 level.

nuts0		Nuts 2	name	RSI0816 > 0 (FILTER)
AT	1	AT12	Niederösterreich	128
	2	AT11	Burgenland	94
	3	AT22	Steiermark	81
	4	AT21	Carinthia	64
	5	AT32	Salzburg	52
	6	AT34	Vorarlberg	40
	Total	6		
BE	1	BE32	Provincie Henegouwen	161
	2	BE23	Provincie Oost-Vlaanderen	49
	3	BE25	Provincie West-Vlaanderen	47
	4	BE35	Provincie Namen	30
	5	BE24	Provincie Vlaams-Brabant	23
	6	BE31	Provincie Waals-Brabant	2
	Total	6		
BG	1	BG34	Yugoiztochen	106
	2	BG32	Severen tsentralen	104
	3	BG33	Severoiztochen	59
	Total	3		
CZ	1	CZ06	Jihovýchod	709
	2	CZ08	Moravskoslezsko	98
	Total	2		
DE	1	DE71	Darmstadt	3512
	2	DE30	Berlin	1402
	3	DEA3	Münster	803
	4	DEF0	Schleswig-Holstein	640
	5	DE80	Mecklenburg-Vorpommern	560
	6	DE12	Karlsruhe	511
	7	DEB2	Trier	381
	8	DE27	Schwaben	356
	9	DE14	Tübingen	326
	10	DE21	Oberbayern	321
	11	DE91	Braunschweig	295
	12	DEA5	Arnsberg	253
	13	DE22	Niederbayern	203
	14	DE72	Gießen	161
	15	DEE0	Sachsen-Anhalt	51
	16	DEG0	Thüringen	48
	17	DE40	Brandenburg	25
	18	DE26	Unterfranken	5
Total	18			
DK	1	DK01	Hovedstaden	542
	2	DK04	Midtjylland	4
	Total	2		
ES	1	ES53	Illes Balears	1422
	2	ES70	Canarias	1115
	3	ES51	Catalonia	1035
	4	ES63	Ciudad Autonoma de Ceuta	103
	5	ES64	Ciudad Autonoma de Melilla	36
	Total	5		
FI	1	FI1B	Helsinki-Uusimaa	273
	2	FI1D	North & East Finland	92
	3	FI20	Åland	11
	4	FI1C	South Finland	4
	5	FI19	West Finland	2
	Total	5		
FR	1	FR71	Rhône-Alpes	306
	2	FR83	Corse	257
	3	FR22	Picardie	204
	4	FR43	Franche-Comte	201
	5	FR82	Provence-Alpes-Côte d'Azur	196

*(continued)*

**Annex 4. Continued.**

nuts0	Nuts 2	name	RSI0816 > 0 (FILTER)	
	6	FR41	Lorraine	170
	7	FR53	Poitou-Charentes	92
	8	FR81	Languedoc-Roussillon	74
	9	FR63	Limousin	55
	10	FR26	Bourgogne	46
	11	FR42	Alsace	39
	12	FR51	Pays de la Loire	21
	Total	12		
GB	1	UKJ2	Surrey, East and West Sussex	1344
	2	UKI1	Inner London	1257
	3	UKN0	Northern Ireland	1104
	4	UKJ3	Hampshire and Isle of Wight	919
	5	UKD6	Cheshire	833
	6	UKF1	Derbyshire and Nottinghamshire	541
	7	UKH2	Bedfordshire and Hertfordshire	314
	8	UKD7	Merseyside	251
	9	UKD1	Cumbria	164
	10	UKM2	Eastern Scotland	130
	11	UKG1	Herefordshire, Worcestershire and Warwickshire	111
	12	UKD3	Greater Manchester	105
	13	UKF3	Lincolnshire	97
	14	UKC1	Tees Valley and Durham	89
	15	UKE3	South Yorkshire	75
	16	UKJ4	Kent	59
	17	UKL1	West Wales and The Valleys	47
	18	UKM6	Highlands and Islands	47
	19	UKD4	Lancashire	19
	Total	19		
GR	1	EL43	Kriti	759
	Total	1		
HU	1	HU21	Central Transdanubia (Közép-Dunántúl)	41
	2	HU33	Southern Great Plain (Dél-Alföld)	28
	3	HU31	Northern Hungary (Észak-Magyarország)	28
	Total	3		
IE	1	IE02	Southern and Eastern	340
	Total	1		
IT	1	ITI4	Lazio	749
	2	ITF4	Puglia	560
	3	ITH5	Emilia-Romagna	451
	4	ITI1	Toscana	435
	5	ITH3	Veneto	277
	6	ITI3	Marche	171
	7	ITH2	Provincia Autonoma di Trento	143
	8	ITH1	Provincia Autonoma di Bolzano/Bozen	46
	9	ITF5	Basilicata	23
	10	ITH4	Friuli-Venezia Giulia	18
	11	ITF3	Campania	17
	12	ITF1	Abruzzo	6
	13	ITF2	Molise	1
	Total	13		
NL	1	NL32	Noord-Holland	3225
	Total	1		
PL	1	PL21	Małopolskie	245
	2	PL52	Opolskie	222
	3	PL22	Śląskie	159
	4	PL11	Łódzkie	155
	5	PL31	Lubelskie	73
	6	PL61	Kujawsko-Pomorskie	37
	7	PL43	Lubuskie	27
	8	PL33	Świętokrzyskie	6
	Total	8		

*(continued)*

**Annex 4. Continued.**

nuts0		Nuts 2	name	RSI0816 > 0 (FILTER)
PT	1	PT15	Algarve	269
	2	PT20	Região Autónoma dos Açores	85
	3	PT11	Norte	69
	Total	3		
RO	1	RO32	Bucuresti - Ilfov	656
	2	RO42	Vest	38
	Total	2		
SE	1	SE23	West Sweden (Västsverige)	140
	2	SE12	East Middle Sweden (Östra Mellansverige)	81
	3	SE33	Upper Norrland (Övre Norrland)	65
	Total	3		
SI	1	SI01	Vzhodna Slovenija	61
	Total	1		
SK	1	SK02	Western Slovakia (Západné Slovensko)	199
	2	SK04	Central Slovakia (Stredné Slovensko)	103
	Total	2		
Total	N	116		