Groupe de REcherche en Droit, Economie, Gestion
UMR CNRS 7321

CONSTRUCTING A NOVEL COMPETITIVENESS INDEX FOR EUROPEAN REGIONS

Documents de travail GREDEG
GREDEG Working Papers Series

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GREDEG WP No. 2014-42
http://www.gredeg.cnrs.fr/working-papers.html

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Constructing a Novel Competitiveness Index for European Regions

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GREDEG Working Paper No. 2014-42

December 2014

Abstract. Space has only recently become a terrain of strenuous economic research. With the New Economic Geography (NEG) integrating into mainstream, many spatial subjects, including territorial, or regional, competitiveness are being increasingly inquired. In line with Krugman (2003), we argue that it is plausible to discuss competitiveness on a regional level, as a capacity of territories to attract and retain mobile factors of production, which is an increasingly important subject in an ever integrating global economy. However, this branch of economic geography is relatively underdeveloped, while it even lacks a universally accepted definition and metrics. In order to overcome this shortcoming, we propose a novel definition, along with a new index on territorial competitiveness tailored for the case of European regions at NUTS 2 level. This paper is structured as follows. In the first part, we provide a short discussion on theoretical background of the study on regional competitiveness and present in brief the key notions used in the literature. It is in that part where we propose and interpret our definition of regional competitiveness. Next, we discuss on ways of quantifying regional competitiveness and on some of the key attempts taken so far. In the third part, we present our index for European regions, by describing the territorial, temporal and methodological choices, theoretical justifications, as well results and their interpretation in the light of the NEG. The fourth part concludes and the fifth contains annexes.

Keywords: Regional Competitiveness, Composite Index, New Economic Geography, Agglomerations, Clustering

JEL Classification: R110, R120

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1. Regional competitiveness – what do we know? Theory and basic terms

A casual look into geographical map of any territory reveals an uneven distribution of population across space. These maps often feature small 'nodal' points of high population density, as opposed to the less inhabited surrounding. Certainly, the uneven distribution of population and economic activity across space can be somewhat attributed to natural causes. Certain climatic conditions and terrain configuration render chunks of territory uninhabitable. On the other hand, fertile land along water sources provides favorable conditions for growth and development of settlements.

However, much of the pattern of uneven spatial distribution of economic activity cannot be attributed solely to geographical reasons, but to a range of endogenous factors[2] (De Bruyne, 2006). In this context, it is the socio-institutional framework which becomes the determinant of attractiveness of a territory for inflows of economic activity.

Given that the activity is unevenly distributed in function of a number of endogenous factors, across a set of different territories, these inter-regional differences can induce migrations of footloose factors of production between locations. In this context, as long as we assume a finite set of factors of production with a marginal level of mobility; territories can be considered to be *competing* for attraction and retention of economic activity. Following this logic, then, a degree of successfulness in this competition can be called *territorial competitiveness* (Camagni, 2002). Thus a competitive region, experiencing prevalence of agglomerative over dispersive forces, enjoys constant net positive migration of mobile factors of production. On the other end of the scale, an uncompetitive region faces constant danger of desertification of footloose factors[3].

However, it needs to be defined what is the type of territory which competes. By following the logics of Krugman (1994), we do not think that nations truly compete the way the sub national entities do. First, a nation state is usually a very heterogeneous entity comprised of a multitude of institutionally diverse regions. Against this backdrop, nations are normally multifaceted, by encompassing both competitive and uncompetitive areas. For instance, when we think of Italian competitiveness, do we refer to its Mezzogiorno or Lombardy part? While the former acts as a periphery, under constant depopulation pressures, the latter is a major international business and transportation hub, under steady pressure of inward migration. Second, nations, unlike sub national entities, dispose of a number of adjustment mechanisms in case of internal or external shocks. For nations can react to sudden pressures on emigration of footloose factors by adapting (macroeconomic) policies to a new reality. Meanwhile, if we assume relatively high factor mobility, sub national entities normally cannot stop this sort of emigration by specific policies, and this is why some uncompetitive regions truly do face constant threat of a desertification[4]. Third, the regional focus reflects the increasing consensus

[2] In the NEG tradition, the former are called 'first nature', and the latter 'second nature' of localities

[3] These relations tend to form the so called 'centre-periphery' relations between regions, which is a phenomenon broadly defined in the NEG literature

[4] For instance, with the Yugoslav common market crumbling in the 1990', much of the industry in the Serbian provincial cities collapsed. This has triggered massive emigration of mobile factors from the interior of the country

that they are the primary spatial units where increasing returns to scale are created, while knowledge is generated and circulated, all resulting in creation of agglomerations of economic activity (Huggins *et al*, 2013).

In this context, we affirm our position that it is areas – sub national territories – rather than nation-states, which compete. A region is a useful choice principally because it is more or less homogeneous, with a relatively similar institutional framework, economic and social structure within its territory, while it normally doesn't dispose of nation-state prerogatives. Along the rest of this article, we will be referring to NUTS 2 type of regions[5], as classified by the Eurostat. This territorial aggregation is a widely used choice among economic geographers, as the statistical data for this level is abundant and easily accessible. A more convenient choice would be a more detailed aggregation, such as the NUTS 3[6] or even more so the LAU[7], but the data accessibility for these levels is still rather poor.

Although the aforementioned concept of regional competitiveness is intuitively well understandable, and firmly oriented towards mainstream models of the NEG, the economics has been unable so far to procure a widely accepted definition. For instance, Lengyel and Lukovics (2006, p. 6) precise that the 'essence of regional competitiveness is the growth in a region, generated by both a high level of labor productivity and employment'. Madies *et al* (2008, p. 28) insist that 'competitiveness concerns the capacities of territories to contribute to creation and development of economic activity, to attract and retain people and capital'. Kitson *et al* (2004, p. 4) that it is 'the ability of regions to attract skilled, creative and innovative people, provide high quality cultural facilities and encourage the development of social networks and institutional arrangements….which are regional externalities or assets that benefit local firms and businesses'. Huovari (2001, p. 1) simply states that 'competitiveness is the ability of regions to foster, attract, and support economic activity so the citizens can enjoy relatively good welfare'. While we think these are successful definitions, we believe they can be somewhat complemented. Hence, we propose a novel definition, as to enable further discussion in this paper. Hence, we affirm that:

The territorial competitiveness is a capacity of a locality to attract and retain mobile factors of production, by providing favorable conditions for a sustainable and simultaneous growth of productivity and employment rate.

By this we mean that economic agents are attracted by the possibility of attaining the *marshallian* type of externalities. These externalities are triggered by operating in a close proximity of (i) abundant and specified workforce, (ii) diverse network of specified suppliers and (iii) technological spillovers[8]. These conditions foster sound productivity growth, driven rather

towards a few remaining centers of economic activity, resulting in rapid growth of population in the nation's capital, and decline of population in peripheral regions.

[5] Regions populated by 800,000 to 3,000,000 inhabitants, such as the PACA

[6] Regions populated by 150,000 to 800,000 inhabitants, such as the Alpes Maritimes

[7] Region populated by less than 150,000 persons, in France referred to as the *canton de rattachement*

[8] Marshallian externalities are thoroughly explained in the NEG literature, see among others Dauth (2010)

by an increasing output than by a decreasing workforce, which is why we are stressing the importance of a simultaneous growth of productivity and employment rate as a *revealed form* of competitiveness (Gardiner *et al*, 2004). As factors of production are migrating between regions, seeking for external economies of scale, in order to discuss territorial competitiveness, we must assume at least a marginal level of factor mobility, i.e. territories are not competing only in autarchy.

Meanwhile, desertification of many lagging regions throughout Europe is prevented by massive transfers, either from their respective governments or from the European common budget. This is why we stress that the *sustainable* characteristic of competitiveness implies that an uncompetitive region would have been deserted, should (i) factor mobility is stronger, and/or (ii) inter-regional transfers are weaker. Thus a policy targeting to increase factor mobility and/or decrease inter-regional transfers would lead to stronger factor migration from the uncompetitive (peripheral) region toward a competitive (central) one, forming a full-fledged center-periphery relation[9].

2. In quest of a measure of the regional competitiveness

A region's competitiveness is only exerted *in relation* to other regions (both within and outside national borders), making it strictly a relative, and not an absolute notion (Berger, 2008). This characteristic of relativity implies the need to measure competitiveness, as to quantify the scope of inter-regional divergences. However, inexistence of a universally accepted definition renders sound quantification difficult. In this context, a number of attempts have been made to quantify regional competitiveness, while these can be broadly divided into two categories. The first tries to link competitiveness to a pre-defined measure, such as the regional GDP per capita, productivity, exports or net migration rate. However, while these measures are useful, they cast light only on certain aspects of the phenomenon. For instance, a rise in regional GDP/capita can be attained by holding the output constant, which is unwelcoming for inward migrations of

[9] In the context of the crumbled Yugoslav market, the 'policy' of increased mobility of factors (mostly population, fleeing from war-ravaged or suddenly de-industrialized areas) and decreased transfers to lagging regions (due to the economic collapse), fortified the so called 'catastrophic' center-periphery relation between the capital Belgrade and the rest of the country. In other words, the lagging areas, supported by massive central-state transfers and subsidies in often obsolete regional industries, did not suffer extreme forms of depopulation before 1990. However, these regions weren't *sustainably* competitive, as that their adjustment to the new 'policy' led also to their extreme desertification.

mobile factors[10]. Also, it can also be attained by extracting valuable natural resources, which, also, has ambiguous relation to local competitiveness[11].

The second category of attempts stresses the importance of deriving tailor-made measures encompassing the multifaceted nature of competitiveness. In practice, these measures are composite indices, which quantify the scope of a certain phenomenon, based on a large number of underlying inputs. Only until 2009, as many as 126 composite indices of regional competitiveness have been published (Berger, 2010). What these indices have in common, is that they are comprised of a number of sub-indices[12], each of these encompassing a variety of indicators. However, the fact that no universally accepted definition of regional competitiveness is available provokes differences in used theoretical frameworks. We broadly discern two main categories of underlying theoretical frameworks. First are the *competitiveness diamond models*[13], which assume that local competitiveness is a function of four determinants, including base factor conditions, firms' strategies, demand conditions and state of related supporting industries. While these determinants broadly relate to the aforementioned marshallian externalities, it should be noted that these analyses might be biased due to possible limitedness of included dimensions, as well as by a rather erratic theoretical background. Moreover, we believe that the major shortcoming of this sort of models is an undefined transmission mechanism, i.e. justification of how the input variables are linked between themselves and to the final outcome.

That shortcoming is well addressed by the second type of models, which are comprised of a variety of different input-output-outcome systems. This framework assumes that a number of base indicators – such as regional educational level, quality of governance, health system, and so forth – influence local revealed competitiveness, such as productivity or employment rates, while these latter translate into a locality's competitive environment for attraction of mobile factors.

A specific type used in a number of successful regional competitiveness indices is the so called *pyramidal model of competitiveness* (Gardiner *et al*, 2004). Under this framework, indices tend to include only the base elements of competitiveness (i.e. the inputs), and not those resulting from the latter (outputs and outcome). Against this backdrop, such an index would tend not to include local productivity or employment rates, which are the key components of regional competitiveness, but rather only the grass-root elements, i.e. describing local quality of infrastructure, education, health and so on.

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[10] If we decompose the GDP/capita (as suggested by Martin, 2003) as follows:

$$\frac{Output}{Population} = \frac{Output}{Total\ employed} \times \frac{Total\ employed}{Active\ population} \times \frac{Active\ population}{Population}$$

Than, holding output constant, rise in GDP/capita can be attained by decreasing (i) workforce or (ii) active population, or (iii) total population, none of which is attractive for inflows of mobile factors.

[11] While extraction of natural resources can be beneficial for fiscal system stability, it can also trigger a number of adverse effects, such as the *Dutch disease* (Papyrakis and Raveh, 2013) or a variety of institutional system malfunctions, otherwise known as the *resource curse* (Humphreys, Sachs and Stiglitz, 2007).

[12] Also called 'pillars' or 'dimensions'

[13] Initially developed by Michael Porter (1998)

This approach can be methodologically sound, as it avoids counting for same effects multiple times, by not including both inputs and their effects, which can distort results. Moreover, if an index counts for *effects* of an action, rather than for *inputs* to such effects, policy construction based on it is jeopardized. As Bristow (2009, p. 88) puts it, a frequent shortcoming of regional competitiveness indices is that they tend to conflate and confuse different input, output and outcome indicators, which makes it very difficult to assert what particular remedial policy interventions within regions are necessary to achieve the desired improvement in outcomes.

Although not all constructors explicitly claim to be building their index under the pyramidal model framework, in most cases it is rather obvious. Some successful attempts, made under this framework, in our view, include models of regional competitiveness made for case of Croatia (UNDP, 2010), Finland (Huovari *et al*, 2001), Hungary (Lengyel and Lukovics, 2006), Central Europe (Lengyel and Rechnitzer, 2013). The literature's most widely acclaimed index is seemingly the Regional Competitiveness Index constructed for the EU27 by Annoni and Kozovska in 2010, and enhanced and enlarged in 2013 by Annoni and Dijkstra to include the EU 28 regions[14] (from here: RCI 2010 and RCI 2013 respectively). These studies were commissioned by the European Commission as a part of preparatory work for the EU' fifth and sixth Report on economic and social cohesion. Its methodological soundness, vast territorial extent, as well as the fact that it is the support document to the European Commission's policies, makes the two publications of this index highly recommendable for further improvements.

3. A novel index

As to improve theoretical and policy discussion on the subject, we are hereby proposing a novel regional competitiveness index tailored for the case of European regions. In some aspects, our index is a build-up to the RCI 2010/2013. Our index is also constructed under the pyramidal competitiveness model framework, with a similar list of dimensions used as in the RCI 2010/2013[15], with, however, significant changes in its internal structure. This means we have used in most dimensions different sets of variables. We would sum the key differences between our index and the RCI in: (i) that we changed the set of observed regions, (ii) we use dramatically different set of variables, by privileging those of input – fundamental – type, while RCI use many resulting (output and outcome) indicators. This is essential, as we aim to build metrics that could be used for planning and tracking of policies – which is unattainable should the model is constructed out of indicators which are resulting from other inputs. The two aforementioned differences are also somewhat interrelated – as a changed bundle of observed regions also induces changes in availability of the data referring to a transformed set of territories. We would also like to point out that our index also uses partially different methodological procedures, especially so in the terms of weighting system, which will be thouroughly described in the part 3.2.

[14] As Croatia acceded to the EU in July 2013
[15] A complete list of dimensions and used variables is provided in the annex

3.1 Conceptual framework

Besides conceptual novelty, this index is also original due to inclusion of regions of Serbia and Montenegro, alongside regions in the European Union. This is the first index, to our best knowledge, to benchmark regional competitiveness of the two latter countries against a set of European regions. The inclusion of regions of these countries is justifiable, as both Serbia and Montenegro are well into membership talks for adhesion in the EU[16]. This means that many barriers for circulation of factors of production between the EU and Serbia/Montenegro are lifted, implying that Serbian and Montenegrin regions also take part in a European – scale regional competition[17]. However, creation of such an index was preempted by the relatively low interest for regional competitiveness in these countries, in sync with low interest for these countries elsewhere in Europe. Moreover, data for these countries is largely inaccessible through Eurostat, which complicates the model construction. These shortcomings don't overcome scope of potential new insights. Indeed, strong regional divergences, both within these countries, and between Serbia/Montenegro and the European core, are evident. With an increasing embeddedness into the Single market, desertification of rural areas towards the few local remaining centers of activity is in recent years complemented by resurging emigration of skilled workers from these local centers toward the European core. Hence we think that quantification to this process could help address some of the issues and draw new insight. However, unlike RCI 2010/2013, we opt out overseas regions, such as Réunion or Ceuta, and the two insular EU members (Cyprus and Malta) as we argue that immense geographical barriers and special political status within their respective countries complicates index construction. Like RCI 2010/2013, we don't count for regions of EFTA[18] and Turkey, mostly due to poor access to data. All in, our model counts for 267 regions dispersed in 27 countries across the European continent.

The temporal horizon is static and the data refer to 2011. This was an unwanted, but the sole possible choice, given that the relatively difficult access to regional-level data in many countries render almost impossible to create a dynamic, multi-annual model. However, many of the variables included are structural; hence, we argue that only very slow changes in scores can be anticipated over a multi-annual period. Thus scores attained from the 2011 data, most likely cast a relatively clear picture on the most recent period.

As we previously stated, we lay foundations to the index in the pyramidal model of competitiveness. In our case, the index is created out of 11 dimensions, encompassing a total of 41 indicators. Variables are, in general, of the input type, meaning that we cared that they represent *inputs* to effects, not the vice versa[19]. We do not take natural differences into

[16] Since 2012 and 2011, respectively

[17] Impenetrable geographical or administrative barriers for trade between regions dismiss regional competitiveness, and if Serbia/Montenegro hadn't been EU candidate states, their inclusion in such an index would be less relevant

[18] Iceland, Liechtenstein, Norway, Switzerland

[19] As to avoid what Bristow states (2009, p. 91) that 'some composite indices tend to conflate inputs (such as the knowledge intensity of businesses), outputs (such as productivity) and the outcomes (such as the income growth and

consideration, as endowment in resources, geographical specificities or any other feature of the 'first nature' of territories cannot be addressed by policies. We explicitly refer to the 'second nature' of localities. Thus we left out some of the variables used in the RCI 2010/2013 and included many others[20]. Some other changes were applied to address inclusion of new regions into the model[21]. All this created relatively important changes to the internal structure of the index.

3.2 Methodological framework

As for the technical perspective, we relied on framework suggested by OECD (2008) and Saisana and Tarantola (2002), as well as, partially, on procedure developed for RCI 2010.

This being said, we first checked for the missing data, whereas we have set a limit of absence above which we had excluded whole series for further examination. In case of retaining a data series which contain missing data points, we basically had two types of situations. If data for NUTS 2 level was inaccessible for a limited number of regions, we replaced these by their respective values at NUTS 1 level. If even NUTS 1 level wasn't available, the data was subjected to the *hot deck imputation.* This means that the missing data was replaced by that drawn from 'similar' responding units[22].

Once obtained full data series, we inverted values of some of the variables, where we judged their direction is opposed to the index[23]. Hence we inverted the value of an indicator x in a region i as follows:

Equation 1.

$$x_i' = \frac{1}{x_i}$$

Now when the data is complete and all indicators are oriented in the same direction as the index, we revert to reducing the asymmetry noticed in some of the data series, making

measures of prosperity)…with no clear sense of what should be the chain of causation…between these different variables'

[20] For instance, in the dimension of 'basic education', unlike RCI 2010/2013, we didn't use nation-level PISA results in mathematics, science and reading, as the latter represent the outcome of a quality of an educational system. Thus we rather used variables describing the accessibility and investments in the basic level education, which are prerequisites for PISA results. Same logic is applied throughout the index.

[21] For instance, while RCI 2013 excludes inflation rate from the pillar of 'macroeconomic stability', we think it is necessary, given the still untamed inflationary pressures in some CEE/SEE countries. Indeed, 12.2% yoy inflation rate achieved in 2012 in Serbia is a good example of how inflation is still a theme in some countries, even despite low domestic consumption amidst the financial crisis.

[22] This choice is justified and fully explained by the OECD's Handbook on Constructing Composite Indicators (2008, p. 55). The 'similar' data is chosen in accordance with relevant literature and experts' opinions.

[23] For instance, we include variable describing the absolute value of spread of employment between men and women, as a substantial literature claims that this sort of labor market failure has a negative influence on regional competitiveness, i.e. the higher the employment rate differences between sexes, the lower is regional competitiveness score.

distributions more symmetric around their central location. In line with Annoni and Kozowska (2010), we do it as follows:

Equation 2.

$$\kappa = \frac{n}{(n-1)(n-2)} \sum_{i=1}^{n} \frac{(x_i - \bar{x})^3}{\sigma^3}$$

Where we have *n* values of the observed variable *x* in a region *i*, with $\bar{x}$ as the arithmetic mean[24], σ as standard deviation[25] and κ as the coefficient of asymmetry. We limit asymmetry level at $|\kappa| = 1$. Should a data series' κ is above or equal to 1 or under or equal to -1; we transform the data by the Box-Cox logarithmic transformation, as follows:

Equation 3.

$$x_i' = \frac{x_i^{\lambda} - 1}{\lambda}$$

For positive asymmetries ($\kappa \geq +1$), we set the parameter λ at 0.05, while for negative asymmetries ($\kappa \leq -1$), the parameter λ is set at 2, which is in line with the RCI 2010 proposition.

In some rare cases, we encountered asymmetric data series containing zero values, where we had to revert to a different form of data series transformation:

Equation 4

$$x_i' = \log(x_i + 1)$$

Once relatively symmetric, we can now normalize (standardize) the data in order to allow for aggregation into scores of dimensions. For this, we used the common *z-scores* technique, where all data series' values are transformed as to allow for standard deviation at 1 and arithmetic mean at 0 (i.e. it has a normal distribution). Thus the transformed value of an indicator *x* for a region *i* is denoted:

Equation 5

$$x_i' = \frac{x_i - \bar{x}}{\sigma}$$

Once the indicators are normalized, we aggregate their values into scores of each of 11 dimensions. There are two types of aggregations encountered. First, if the indicators within each dimension are not highly correlated, we aggregate the indicators by a simple arithmetic mean,

[24] $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$

[25] $\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})}$

with coefficient of correlation $|r| = 0.3$[26] being set as the boundary of high correlation. In other words, in this case, in aggregation of dimensions, each variable is attributed the same weight, as indicators are not substantially related. If, however, they are excessively related, it could distort the results by making the same effect count multiple times. Hence, for cases of $|r| \geq 0.3$, we run principal component analysis (PCA), as to determine optimal component(s) of each dimension containing multi collinear indicators. A bundle of obtained components is than reduced to those components whose eigenvalue surpasses the value of 1. By running PCA, each variable within a dimension is, hence, attributed a different weight, as to decrease the adverse effect of collinearity. For the sake of robustness, we also run the Kayser-Meyer-Olkin (KMO) post-estimation test, in order to check for sample adequacy[27].

Finally, the set of obtained dimensions is aggregated into final index scores. However, in our index, as well as in RCI 2010/2013, dimensions are classified into three categories[28], as to take into consideration that they do not have the same effect at all levels of regional development[29]. Some dimensions, such as the physical infrastructure, should have different effect on a highly developed region, than on a road-network strapped one[30]. Thus, following the logic of RCI 2010/2013, we divide the 11 dimensions into three groups, each having different ponders in the final score, in function of a region's development level. In absence of a more fitting measure, we approximate development as the regional GDP/capita. In order to obtain a finer picture, we deploy seven cohorts of regional development[31], which are obtained in relation to the average European GDP/capita[32].

Concrete weights are attributed to each dimension in every region, in function of category of regional development. Although our weighting system was inspired by that of RCI 2013, we nevertheless make some adjustments that we deem important, presented by the following figure.

Figure 1. Weighting system

[26] $r = \frac{1}{n-1}\sum_{i=1}^{n}\left(\frac{x_i-\bar{x}}{\sigma_x}\right)\left(\frac{y_i-\bar{y}}{\sigma_y}\right)$

[27] For KMO's below 0.5, which is the level described in practice as minimum, we would change the internal composition of a dimension, as to exclude redundant, or include supplementary variables. After this change, we would replicate the whole described procedure, until a satisfactory robustness is attained.

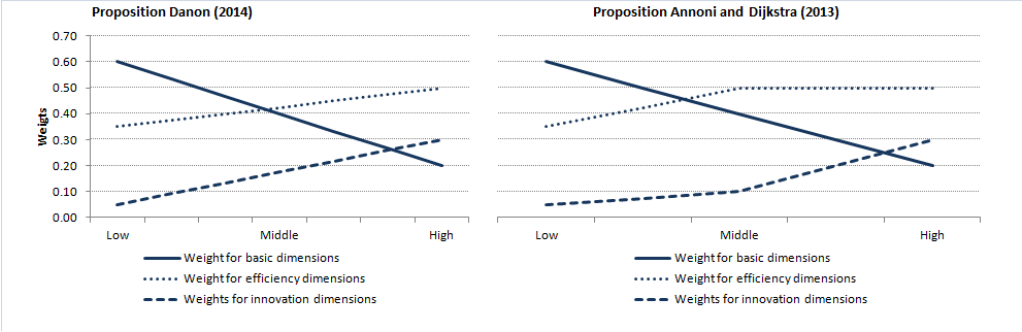
[28] Basic dimensions, efficience dimensions, innovation dimensions

[29] In regional competitiveness indices, it is a common idea to categorize regions by development, which is in turn approximated as GDP/capita.

[30] For a more detailed argumentation on this subject, please refer to Chiappini (2012) or Sala-i-Martin and Schwab (2012).

[31] Unlike RCI 2010, which has three, and RCI 2013, which has five levels of development. Although the concrete number of cohorts is arbitrary, we think nevertheless that more cohorts provides more fine-tuning, which is a useful characteristics, against the backdrop of very a diversely developed landscape across Europe

[32] Cohort thresholds are: >175% of European average, between 175% and 150%, between 150% and 125%, between 125% and 100%, between 100% and 75% and <75%.



Source: Author

Annoni and Dijkstra develop a non-linear relation between weights attributed to each group of dimensions and level of a region's development. In our case, weighting system is altered as the rise/fall of weights of each group of dimensions now has a strictly linear and monotonous relation to level of development. Many composite indices suffer from significant amount of arbitrariness, and reducing its level is always recommended. Hence, any non-linearity of weighting would imply a theoretical justification behind; in its absence, it serves no purpose.

This being said, our regional competitiveness index *I*, for a region *r*, each group of dimensions (*a*,*b*,*c*, respectively), and weights α, β, γ associated to each group of dimensions, is specified as follows:

Equation 6.

$$I_r = \alpha\left(\frac{\sum_{a=1}^{5} r_a}{5}\right) + \beta\left(\frac{\sum_{b=1}^{3} r_b}{3}\right) + \gamma\left(\frac{\sum_{c=1}^{3} r_c}{3}\right)$$

3.3 Dimensions explained

As we stated, we include 11 dimensions into our index. Although inclusion of these dimensions is somewhat influenced by prevailing choices in relevant literature, their list is still original in our case. What is more, the internal structure in most dimensions differs largely from the aforementioned studies. We will try now to make a brief overview of all 11 dimensions, and to procure in short the theoretical justification of their inclusion, while the complete list of included indicators is provided in the annex.

D1 – health system. Solid quality of health system in a region translates into economic results as healthy population enjoys a solid increase in productivity and participation rates (Hsiao and Heller, 2007), cognitive capacities of students and school attendance ratios (Jackson 1993; Kramer et al, 1995; Novello *et al*; 1992). It can also increase life expectancy, which, in turn can promote saving rate, and thus facilitate access to financing (Bloom and Canning, 2000). Another positive effect of a quality health system could include increased revenues from medical services

(Hsiao and Heller, 2007), which improves local balance of payments dynamics. On the other hand, we can anticipate the adverse health condition of the local population to increase pressures on the local fiscal system, as well as on local households' costs.

Hence, on a local scale, a quality health system should enhance factor inflows into a region, as healthcare coverage (i) decreases the cost-of-living dispersion effects for households, while increasing (ii) productivity rate and (iii) activity rates. As for the two latter, with the NEG suggesting that footloose factors are migrating in function of potential external economy of scale effects, we argue that a more productive and abundant workforce could make an incentive for inflows of enterprises into a territory.

Objectives of health systems, according to the World Health Organization (2000), should include: (i) increase in local health conditions, (ii) wide accessibility and (iii) financial equality. Hence the indicators that we use describe local accessibility to health infrastructure and staff. Moreover, we use an indicator on nation-wide investments in health system, as a proxy of modernity of health system physical infrastructure and equipment[33]. More detailed information in variables, descriptive statistics and aggregation methods, is included in the annex.

D2 – primary and secondary education. Technical know-how and fundamental knowledge, distributed in elementary and secondary schools, and their link to productivity and potential growth rate is elaborately described in literature[34]. Moreover, we argue that local availability of a good regional vocational education and training system, delivers abundant qualified workforce, which in self is incentive for inward migrations of enterprises and households. However, we differentiate primary/secondary education dimension from the tertiary education dimension. We argue that the latter has a somewhat different role, directed towards creation and territorial diffusion of a more specialized knowledge (Ohme, 2003). Thus, the variables that we use describe the accessibility of local primary and secondary schools to population, distribution of fundamental knowledge in the local active population, as well as nation-wide investment intensity in basic and secondary education systems.

D3 – physical infrastructure. Accessibility is a classic subject in NEG models, which generally assume that decreased transportation costs induce increased factor movements[35]. Improved transportation systems increase productivity of local enterprises (Aschauer, 1989), while it increases efficiency of resource utilization (Cresenzi and Rodriguez-Pose, 2008). Enhanced access to other regions contributes to convergence of less developed regions (Annoni and Kozovska, 2010). Hence, good local infrastructure decreases transport costs, promotes specialization and increases productivity, which functions as a positive externality shared by all economic agents in one territory. This dimension in our index includes various density-of-

[33] As we have noticed, many East-European regions boast excellent accessibility indicators, such as high levels of ratios hospital beds to population. However, this can be elusive, because most of the high capacity health infrastructure in the East European regions was constructed in the socialist period, while health care investments in these countries rapidly fall since 1990. We include the third variable to control for this bias.

[34] For instance, see Krueger and Lidahl (2001), Sianesi and Reenen (2003) or Hanushek and Wosmann (2007)

[35] This link is theoretically ambiguous, as models point out that decreased transport costs can both induce movements towards central regions, or, for extremely low transport costs, to periphery.

infrastructure ratios, as well as size of local transportation sectors, as to control for transportation hub effects in local economies.

D4 – macroeconomic stability. Although regions generally don't dispose of monetary and fiscal policy prerogatives, their effects normally translate into local economies. Fiscal and external imbalances provoke continuous pressures on price and FX stability, which decreases potential of long-term planning and hence decreases efficiency of resource allocation[36] (Sadni-Jallab *et al,* 2008). Macroeconomic instability provokes high interest rates, deters fixed investments, decreases access to financing and in turn decreases potential growth. Episodes of macroeconomic stability also lead to a decrease in household consumption, which is unwelcoming for inflows of footloose factors of production.

We use the inflation rate, absolute value of oscillations of FX rate and fiscal system sustainability as proxies for instability, in line with the recent research (Fischer, 1993 or Jarmillo and Sancak, 2007).

D5 – institutions. Formal and informal institutions, as a set of constraints structuring economic interactions in a society (Garside, 2009), have a direct effect on transaction costs (North, 1990). Thus, similarly to transport costs, they can promote specialization and increase productivity. Institutions, especially at an informal level, have a strong local characteristic (Rodriguez-Pose, 2010). This has for effect that the territorial capacity of attracting mobile factors of production is partially shaped by the local quality of institutional system (Degirmenci, 2011)[37].

However, the inclusion of this dimension in regional competitiveness models is somewhat complicated by poor access to regional data. This is why we are following a typical choice of regional economists to use the nation-wide World Bank provided through World Governance Indicators.

D6 – tertiary education. Like the primary/secondary education, this layer of educative system also promotes factor productivity through increasing quality of workforce knowhow (Azariadis and Drazen, 1990). Unlike basic levels of educations, it promotes the creation of a highly specialized labor, capable of (i) creating, (ii) imitating and (iii) diffusing technological knowhow, while presence of a university in a region draws talented individuals and specialized enterprises from other localities (Krugman, 2003). It is one of basic requirements for growth in the knowledge-driven economies (OECD, 2009). Given that proximate relationship generates knowledge and spillovers (Nozawa, 2011), the system of a knowledge-based economy is a

[36] For instance, constantly elevated external imbalance in Serbia and low foreign investments render the country's balance of payments dependent on foreign borrowing inflows. In episodes of global risk aversion, such as in mid 2014, foreign carry trade inflows drastically decrease, causing fierce depreciations. These depreciations normally do not lead to significant increase in external competiveness, given the significantly import-oriented economy, but inversely, lead to a strong rise in inflation, debt servicing costs, rising NPL's and to a decreased fiscal expansionism potential. Thus in the 2008-2014 period, prices rose by 58%, while the currency weakened by 45%, which has seriously deterred fixed investments, and shift towards a higher value added activities.

[37] For an econometric test on the link between corruption and FDI, see Al Sadig (2009), corruption and fixed investments (Asiedu and Freeman, 2009), corruption and labor mobility (Cooray and Schneider, 2014) or Bertocchi and Strozzi (2008).

highly localized matter (Maskell and Malmberg, 1999). This is why we argue it serves as an incentive for inward mobility of specialized enterprises and labor in a local economy.

As a proxy, we use accessibility to universities, distribution of university degree holders in the local active population and nation-wide investments in high education.

D7 – labor market efficiency. Significant and persisting differences in employment and unemployment between sexes, inefficient allocation of labor across the economy and massive long term unemployment rates point to considerable structural imbalances in an economy, as well as to, in some cases, institutional inefficiencies (World Bank, 2006). These inefficiencies lead not only to sizeable productivity gaps, but also to depreciation of human capital potential (Petrongolo, 2014), and endanger social and mental development of persons in such situations, while they stimulate outward migratory flows of population, especially young and qualified (Bednarik *et al*, 2011). All these factors make that labor market inefficiencies are (i) local in nature, and (ii) have outward negative effects on mobile factor inflows. In order to control for the adverse effects of structural imbalances on the labor market, we introduced variables describing absolute values of spreads in unemployment/employment rates between sexes, as well as share of long term and youth unemployment in total unemployment

D8 – agglomeration of demand. The size-of-market effect has a key effect on creation of attraction of enterprises into a locality, which are seeking for lower transport costs to their markets. An increased density of enterprises on a market helps increase a variety of goods and services that are locally produced and consumed, which is favorable for inflows of workers. The sort of a virtuous *circular causation*, forged this way, promotes specialization of economic agents and their productivity (Chaney and Ossa, 2012; Melitz and Ottaviano, 2008; Wheaton and Lewis, 2002). Moreover, growth of local market renders production of imported goods and services more profitable locally, which helps increase regional net exports (Krugman, 1998). As a proxy, we quantify the size of markets to enterprises, in terms of GDP and population, in close proximity, i.e. in home and neighboring regions.

D9 – agglomeration of specialized supply. In the aforementioned process of circular causation, the agglomerating economic activity in a locality promotes specialization. In this context, physical proximity of specialized enterprises brings about external economies of scale and facilitates technological spillovers (Mare and Timmins, 2007). A critical mass of such specialized economic activity generates growth and development of clusters (Rosenfeld, 2003), as a particular type of territorially-delimited network of related industries, which facilitates moving up the value chain of the local economy (Roelandt and Hertog, 1999). Such grouping thus helps generate marshallian externalities, which is an incentive for inward mobility of factors of production. Against this backdrop, we try to quantify this effect by measuring the size (in terms of share in regional employment and GVA) of sectors of high-value added activities.

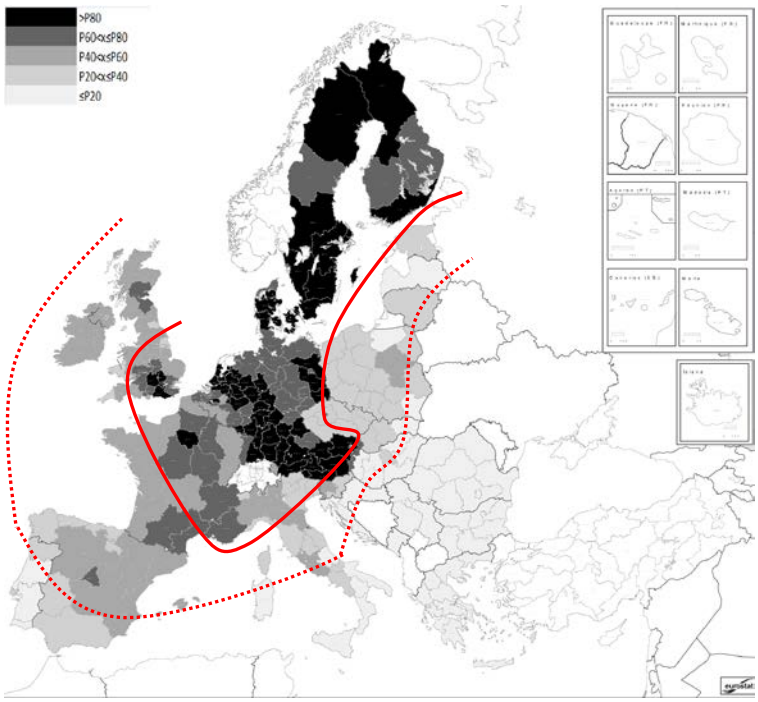
D10 – innovation, D11 – IT infrastructure. Technological improvements are perceived as one of the key determinants of productivity growth (Peyrache and Filipetti, 2012). Moreover, technological improvements are a cohesive factor in relations of enterprises, scientific community and enterprises in a local environment (Cantwell and Iammarino, 2000), which is

why innovation is a localized matter. While innovation and spillovers are enhanced by proximity, this latter is amplified by low communication costs, which is why we also count for IT infrastructure development. As a proxy for these effects, we use the size of the local R&D communities, local knowledge clusters, as well as connectivity of local households, enterprises and public services to internet.

3.4 Results and interpretation

We present the final scores graphically, by dividing the total set of scores into five 20 percentile-large groups, as follows:

Figure 2. Graphical presentation of regional scores



Source: Author

We draw a set of conclusions from the observed results. First, as we had initially expected and in line with the lessons drawn from the NEG models, competitiveness shows a cross-regional clustering characteristic. With mobile factors of production being drawn into localities in a search for higher external economy of scale effects, activity tends to cluster in a relatively delimited space. In this context, competitiveness obviously spills over between regions, hence evidently creating territorial clusters, which in our case, is situated in the central and north-western parts of Europe, in an area roughly corresponding to a crescent between London,

Benelux, south-west Germany, Austria and north Italy[38]. This evidence confirms the existence of a 'blue banana' pattern of localization of core of European economic activity, reported in a number of other NEG – related papers[39]. Specific to our model, the 'blue banana' is expanded into Scandinavia. The latter point shouldn't be disregarded, as most of this territory in the past decades rose to an international hub of high-end technology, finance and communication, even despite its traditional geographical remoteness and unwelcoming climatic conditions. Thus, rapid increases in productivity in Scandinavian countries, as well as their increasing openness, reversed their traditional status of emigration pools into an international hotbed of high skilled immigration along the second half of XX century[40]. Thus by adding Scandinavia into the traditional 'blue banana' pattern, we insist on a possibility of a core-periphery dynamism, which allows for expansions or dismantling of long-standing relationships between the two zones.

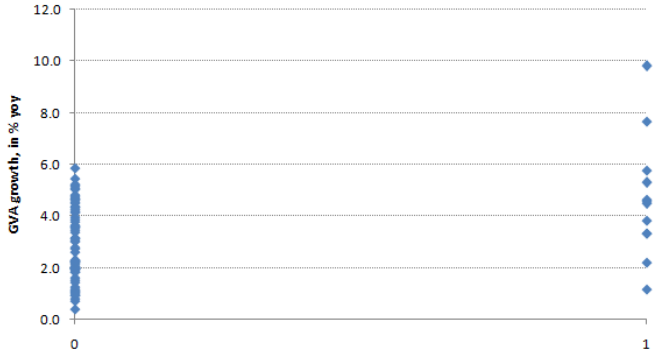
Secondly, scores also clearly disperse in function of distance from this central zone. In contrast to the European core, the outermost regions[41], situated in southern parts of Iberian and Apennine peninsulas and the whole South-eastern Europe (SEE) have a role of the peripheral zone. Finally, an 'intermediary' area between the two zones can be understood as transitory/converging. Indeed, at least in the Central and Eastern Europe (CEE), this area is made up of countries having longer been integrated into global markets than their SEE peers, and are normally thought of as relatively successful transition economies.

Thirdly, nation-wise, capitals are usually the most competitive, as regions containing capitals normally have the largest score within their respective countries. Interestingly, the only exceptions are found in Western Europe (such as Italy, Germany or Netherlands), while all of the SEE/CEE countries feature prevalence of capitals in competitiveness scores. The largest positive gap between the capital region and the country mean is in Greece; with its 3-million large capital Athens dominating the 10 million large nation. Thus our results show almost half a z-score higher score of Athens than the Greek average. The similar pattern is visible in some of the countries which saw rapid growth and convergence in recent decades, such as the Czech Republic, Slovakia, Greece, Poland or Spain[42]. This can point to a conclusion that in some cases, economic growth can be driven by increasing agglomerative forces in and around major national centers[43]. However, some countries feature extreme form of this pattern, where economic activity is clearly clustered within only one region, unlike, for example, London or Paris, which evidently spill over competitiveness into neighboring regions. Thus differences between the best and the second best region are the highest in Czech Republic or Bulgaria, whose capitals are sort of 'competitiveness islets', immediately surrounded by a periphery. It could also lead to a conclusion that during the transition period, only the capitals of the post-socialist countries

[38] Marked by the full line
[39] For instance, see Hospers (2002), Brakman *et al.* (2004), Metaxas and Tsavdaridou (2013).
[40] Worth of noticing is that immigrants to Scandinavian countries (Denmark, Finland, Norway, and Sweden) hold university diplomas in a significantly higher percentage than the European average (32%, 22%, 41% and 36% respectively against Euro Area's 19%, data as of 2013).
[41] Delimited by dashed line
[42] For a wider discussion, please refer to Quah (1996)
[43] In line with a significant theoretical body (see for instance, Cerina and Mureddu, 2009)

actually converged toward European core, while the traditional territorial gaps actually deepened In fact, the most of South periphery / CEE converging countries saw much higher productivity growth (as measured by GVA growth) than their national counterparts, even despite a higher basis effect, leading to a further peripheralization of lagging localities. This being said, it seems that the CEE capitals were the only converging regions which actually stepped into a sort of international cross-regional competitiveness, by adapting to technological changes and opening to globalization of factor flows[44]. Along this process, the national factor flows towards local centers of activity obviously increased, thus locking the remainders of converging countries into a sort of double-periphery, i.e. periphery towards both national capitals and European core.

Figure 3. GVA growth in South periphery and CEE countries, average in the period 2000-2011



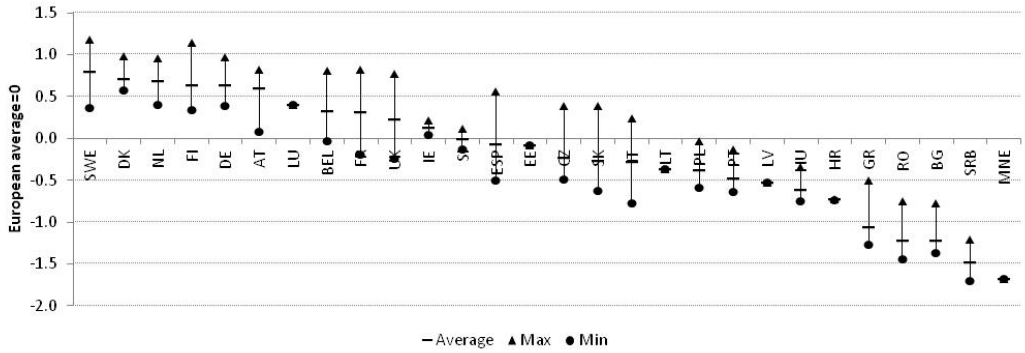
Note: 0 represents non capitals, 1 are capitals

Source: Eurostat

However, the largest negative gap to a national average is reported in remote west-European regions, such as Cornwall, Corsica, Sardinia or West Wales. Growth and development of their respective countries, driven by the activity in their capitals, possibly led to their deeply peripheral position and gradual desertification, almost beyond possibility of a policy tackle. Hence, although these peripheral locations have, in some cases, relatively large GDP/capita, economic activity is nevertheless under constant pressure on factor outflows. Indeed, the highest best-to-worst ratio are found either the European core, or in the 'intermediary' zone – such as in France, Belgium, Spain, Poland or Italy.

Figure 4. Country-wise regional scores

[44] According to Maza and Villaverde's (2012) database on regional FDI in Europe, in the period spanning from 2000 and 2006, the capital cities of CEE/South periphery countries attracted between app. 30% (Poland and Spain), to 80% (Czech republic, Bulgaria, Romania) of the total inflows of foreign direct investments into their respective countries.



Source: Author

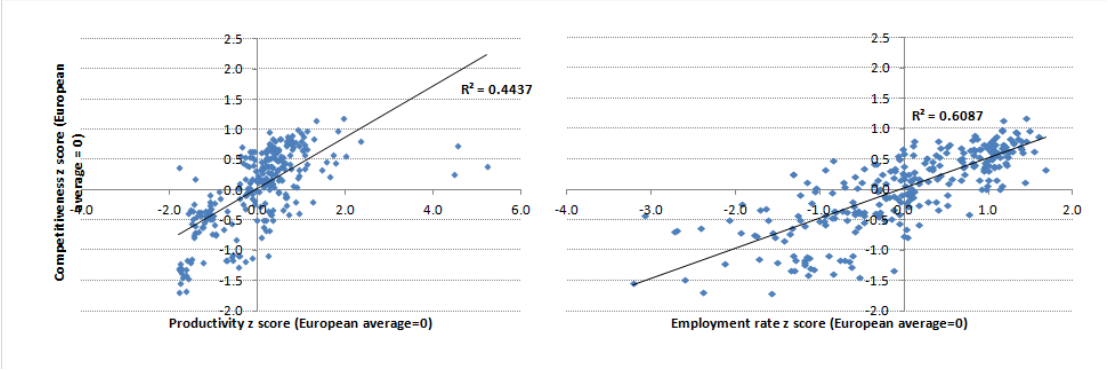
This piece of evidence shows that one of the key questions stemming from the subject of regional competitiveness should be addressed to the role of inter-regional differences. As it seems, in some cases, the deep-rooted center-periphery patterns are clearly promoting stronger national growth. Indeed, in most activities, agglomerations allow minimizing production costs via relatively low transaction/transport costs and more efficient matching pools of workers and employers (Fujita and Thisse, 2002). Thus some national economies are favored by agglomerations (Storper, 2011), while even residents of peripheral regions enjoy cheaper imports of high variety of goods and services as well as, possibly, increased transfers from the central regions. On the other hand, wide inter-regional differences can in the same time hamper growth, as they do not allow for optimal resource utilization in peripheral areas. This 'efficiency vs equity' dilemma, between letting economic processes pursue their natural direction towards creation of large agglomerations, or funneling activity towards peripheral regions is plausibly the key unanswered regional economic question.

However, whether a pro-efficiency or pro-equality policy is targeted, is plausibly in function of type and scope of peripheral locations. For instance, the SEE' remote locations are locked in the 'double periphery', i.e. they are peripheral in low-developed countries. With a very low basis effect for growth, as suggested by NEG literature, the peripheral position of these locations will plausibly increase, as their countries converge. Hefty investments in these locations, coupled by generally low institutional quality in these countries, could generate significant waste of resources.

Wherever policy wishes to decrease competitiveness lags, as to reduce center-periphery effect, or stimulate present agglomerations, in order to increase agglomeration-driven efficiency, we confirm that, in line with our initial expectations, competitiveness is comprised out of two key pillars: productivity and employment rate[45].

Figure 5. Coefficients of determination (competitiveness to revealed competitiveness)

[45] The two usually denominated as 'revealed competitiveness'.



Source: Author

That being said, we stipulate that policies should target factor productivity, while promoting equal access to labor markets to all active population categories. Investments in labor, i.e. its health or education, are plausibly the most effective competitiveness policies (Brakman, 2004), given that labor is not infinitely mobile. Hence at least a fraction of investments in human resources can always be expected to remain in a region. Unlike this, capital-targeting competitiveness policies, such as earmarking subsidies to private companies, can lead to full capital relocation[46]. Although regional policies are often biased towards investments in infrastructure (Brakman *et al*, 2004), the NEG theory suggests that decreasing trade costs can shift activity in both ways. Namely, lower trade costs might cut off the peripheral locations even more, as it becomes more efficient for companies to serve both central and peripheral markets from the core. Thus what matters for competitiveness is plausibly the type of infrastructure projects, with an accent on creating links within regions, rather than between regions (Forslid, 2004), as to enhance resource gathering efficiency in localities.

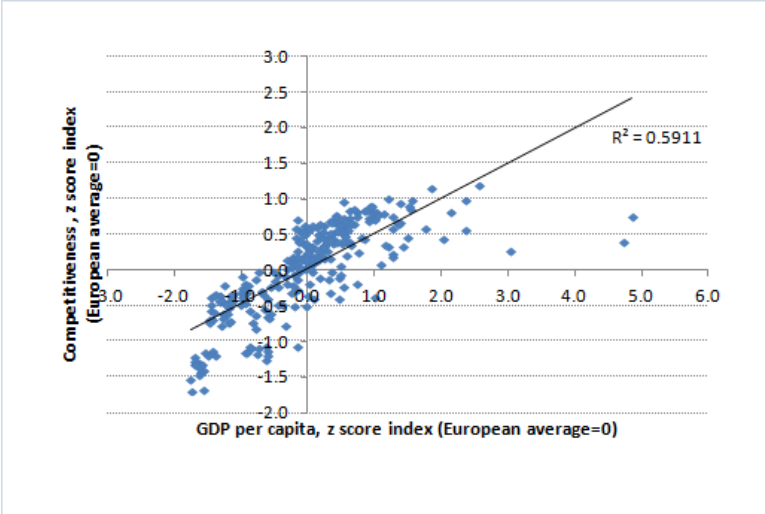
Fourthly, we would like to point out in a more detailed fashion the results obtained for Serbia/Montenegro regions, as it is the first time these regions have been benchmarked against a set of other European territories. These regions are found at the bottom of European ranking. The most severe lagging behind the European counterparts is to be found in pillars of institutions, basic and tertiary education systems, labor market inefficiencies and their significant distance to the European core. While the latter is not possible to alter by policies, the distance issue can be somewhat mitigated by reducing transport costs via infrastructural improvements. The former group of factors is well targetable by traditional development policies, oriented towards increasing labor factor productivity. A more challenging part is to alter institutional framework, especially in the case of informal institutions, which could be key obstacle for attraction of capital and workforce. Not only that the lags are visible vis-a-vis their European counterparts, but somewhat significant inter territorial differences are found in the four Serbian regions. In this

[46] For instance, massive subsidies were paid by the Serbian gvt. to foreign companies willing to set up production in remote areas, in the period between 2009-2014. While the policy did bring about a modest rise in labor-intensive employment in the tradable sector in peripheral areas, many companies relocated their HQs to major national agglomerations. Thus this fiscal expansionism seemingly partially led to capital relocation from the periphery back to the center.

context, the capital Belgrade comes out as a dominant region, attracting the most of footloose factor flows. As the country keeps increasingly integrating into the Single market, it is plausible to expect these flows to strengthen, in line with NEG models and the aforementioned CEE experience.

Finally, we would like to point out that the index show high correlation with the regional GDP/capita[47], meaning that, as we initially expected competitive regions are more prosperous. However, and in line with RCI 2010/2013, as well as with Stiglitz, Sen, Fitoussi report (Stiglitz *et al*, 2009) we take a somewhat wider approach to the problem.

Figure 6 Coefficients of determination (competitiveness and GDP/capita)



Source: Author

3.5 Uncertainty analysis

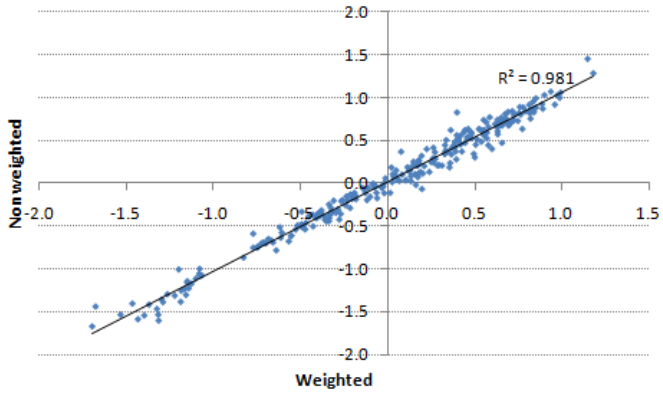
Given that some steps in creation of composite indices can include a degree of arbitrariness, we check for uncertainty of final index scores to changes in some of key model assumptions. In our case, we focus on weighting system robustness from two basic approaches. In the first one, we compare the obtained results to an alternative scenario, in which dimension scores are aggregated as a simple arithmetic mean (i.e. they are non-weighted). Secondly, we want to control for uncertainty stemming from deploying regional development thresholds. Given that weighting system assumes that different dimensions have different effects in function of level of development, we create 'uncertainty corridors' by letting weights oscillate randomly within a range around their central value. Thus we run a Monte Carle simulation to quantify the scope of uncertainty[48].

[47] r=0.77

[48] The procedure follows proposition of Annoni and Kozovska (2011). Concrete values of 'uncertainty corridors' of ranges around their central values, is provided in the appendix

In the first case, benchmarking original results (weighted index) against the alternative scenario (non weighted index) yields insignificantly small differences.

Figure 7.



Source: Author

In this context, we also wanted to conduct a region-to-region score difference analysis, i.e. to see what is the gap between weighted and non weighted scores for each region. By setting critical limits of score differences as:

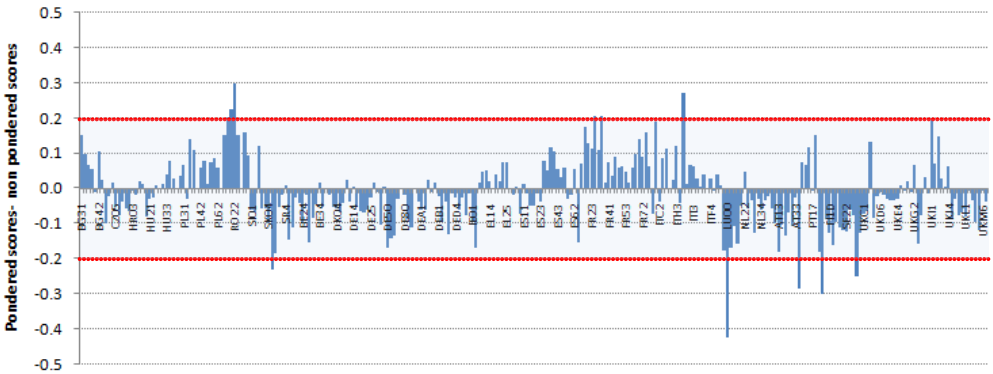
Equation 7.

$$Upper\ critical\ limit \geq Difference_{max} - \frac{Difference_{max} - Difference_{min}}{10}$$

$$Lower\ critical\ limit \geq Difference_{min} + \frac{Difference_{max} - Difference_{min}}{10}$$

Only 8 (3%) regions are out of the observed range, as shown on the figure:

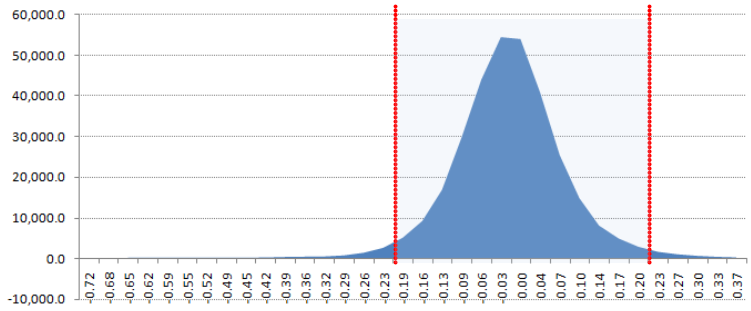
Figure 8.



Source: Author

If we can conclude that weighting system itself doesn't distort the scores in a significant measure, we should test for sensibility of weights. In this context, we run Monte-Carlo simulation. This means that for each 267 regions, we run 1,200 alternative simulations with changed weights oscillating around the central value. This way we obtain the new 320,400 scores that are benchmarked against the original ones. The distribution of obtained results is rather concentrated, as more than 95% of results are found in a band of +/-0.2 index point around original scores.

Figure 9.



Source: Author

4. Conclusion

This article intended, firstly, to provide a novel definition to the concept of regional competitiveness, as to empower the theoretical and empirical discussion in this field. By connecting this subject of research to the NEG models, we try to anchor this discussion within a robust theoretical framework. Secondly, we wanted to provide a new measure for this phenomenon for European regions. Some previous successful attempts (such as RCI 2010 / 2013), were the foundation to our model, while we provided a number of enhancements, including, the most important, change in internal structure (i.e different use of indicators).

Our results point to conclusion that economic activity is drawn into competitive locations, whereas these latter tend to cluster in delimited areas. Such a pattern is visible in Europe, where we find three competitiveness zones, including the 'core', 'periphery' and 'intermediary' areas.

Our model may serve as a useful contribution to policy construction or for territorial benchmarking. In case it is run each year, multi annual data could yield valuable information on dynamics of competitiveness in Europe.

The key unanswered question in regional economics, in our view, remains in the 'efficiency vs equality' dilemma. In this context, our index shows highest regional divergences in converging countries, contributing another piece of evidence on ambiguous relation between agglomeration, competitiveness and growth. However, whatever the policy direction, we stipulate that the key policies to be promoted are investments in labor productivity in sync with reducing labor market inequalities, which can contribute to a more balanced regional development and increase potential growth in the same time.

5. Annex

Figure 10. List of indicators

Group of dimensions	Dimension	Indicator	Unit of measurement	Territorial extent	Source:
Basic dimensions	Health care	Hospital capacity	Beds/1,000 inhabitants	NUTS2	Eurostat
		Accesibility to medical staff	Medical doctors/100,000 habitants	NUTS2	Eurostat
		Health investments	EUR/inhabitants	Country	Eurostat
	Macroeconomic stability	Inflation rate	% yoy, 5Y average	Country	Bloomberg
		Oscillation of FX rate	% yoy	Country	Bloomberg
		10Y T-bond yields	% yearly rate	Country	Bloomberg
	Institutions	Law primacy	Composite index	Country	World Bank
		Corruption	Composite index	Country	World Bank
		Governance efficiency	Composite index	Country	World Bank
		Political stability	Composite index	Country	World Bank
		Quality of regulation	Composite index	Country	World Bank
		Transparence of power	Composite index	Country	World Bank
	Primary and secondary education	Expenditures per pupil	EUR/pupil	Country	Eurostat
		Expenditures per high school student	EUR/student	Country	Eurostat
		Accessibility to elementary schools	% of school age children enrolled to local schools	NUTS2	Eurostat
		Accesibility to high schools	% of high school persons enrolled to local schools	NUTS2	Eurostat
		Abundancy of high school diploma holders	% of high school diploma holders in active population	NUTS2	Eurostat
	Physical infrastructure	Size of transport sector	Share of transport sector in employment	NUTS2	Eurostat
		Density of motorways	Km/1.000 km2	NUTS2	Eurostat
		Density of railways	Km/1.000 km2	NUTS2	Eurostat
		Size of air traffic	Absolute number	NUTS2	Eurostat
		Accessibility to vehicles	Motor vehicles/capita	NUTS2	Eurostat
Efficiency dimensions	Tertiary education	Expenditures per student	EUR/student	Country	Eurostat
		Accessibility to universities	% of university age persons enrolled to loc. universities	NUTS2	Eurostat
		Abundancy of university diploma holders	% of university diploma holders in active population	NUTS2	Eurostat
	Labor market	Drop out ratio	part of 18-24 cohort, not to pursue university education	NUTS2	Eurostat
		Long term unemployment	% of 12-month longer unemployment in total unpml.	NUTS2	Eurostat
		Employment gap	Absolute value of gap in employment between sexes	NUTS2	Eurostat
		Unemployment gap	Absolute value of gap in unemployment between sexes	NUTS2	Eurostat
		Youth unemployment	% unemployment in 18-24 cohort	NUTS2	Eurostat
	Agglomeration of demand	Potential market (GDP)	Size of home and neighboring regions' GDP	NUTS2	Eurostat
		Potential market (population)	Size of home and neighboring regions' population	NUTS2	Eurostat
Innovation dimensions	Agglomeration of supply	Specialization in financial intermediation 1	% of fin. Inermediaiton in employment	NUTS2	Eurostat
		Specialization in financial intermediation 2	% of fin. Inermediaiton in GVA	NUTS2	Eurostat
		Specialization in high tech clusters	% of high tech clusters in employment	NUTS2	Cluster observatory
	Innovation	R&D staff	% of R&D staff in employment	NUTS2	Cluster observatory
		Intensity of R&D	% of R&D in GDP	NUTS2	Eurostat
		Specialization in educative clusters	% of education clusters in employment	NUTS2	Cluster observatory
	IT infrastructure	Connectivity of households	% of households with broadband access	NUTS2	Eurostat
		Connectivity of enterprises	% of enterprises having internet site	Country	Eurostat
		E-government spread	% of population using internet for relations with gvt	Country	Eurostat

Source: Author

Figure 11. Descriptive statistics

	Hospital capacity	Accessibility to medical staff	Health investments	Inflation rate	Oscillation of FX rate	10YT-bond yields	Law primacy	Corruption	Governance efficiency	Political stability	Quality of regulation	Transparence of power	Expenditures per pupil	Expenditures per high school student	Accessibility to elementary schools	Accessibility to high schools	Abundancy of high school diploma holders
Variable code	hosp	med	hinv	infl	fx	yld	lrw	cor	gvtef	stab	rgl	trans	expup	exhss	ownl	ownh	obuh
Orientation	Positive	Positive	Positive	Negative	Negative	Negative	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive
Max	12.7	895.5	4,732.0	6.5	6.5	0.0	2.0	2.5	2.3	1.4	1.9	1.7	13,033.4	18,622.4	108.1	106.4	77.9
Min	1.4	90.7	273.8	0.1	-2.9	0.0	-0.3	-0.2	-0.3	-0.3	-0.1	0.2	1,100.0	1,502.4	82.6	67.2	15.5
Average	5.3	337.8	2,493.6	0.4	2.8	0.3	1.2	1.1	1.2	0.6	1.2	1.1	6,730.5	9,005.9	95.1	91.0	43.0
Standard deviation	2.0	103.2	1,221.9	0.3	1.7	0.2	0.6	0.8	0.6	0.4	0.5	0.3	2,061.6	1,935.0	3.1	7.7	13.7
Coefficient of variation	38%	31%	49%	89%	62%	56%	50%	72%	52%	62%	38%	28%	31%	35%	3%	9%	29%
Asymmetry	0.4	1.2	-0.3	4.9	-0.6	0.2	-0.7	-0.4	-0.5	-0.3	-0.4	-0.8	-0.8	0.7	-0.6	0.9	-0.1
Correction of asymmetry?	no	yes	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no

	Size of transport sector	Density of motorways	Density of railways	Size of air traffic	Accessibility to vehicles	Expenditures per student	Accessibility to universities	Abundancy of university diploma holders	Drop out ratio	Long term unemployment	Employment gap	Unemployment gap	Youth unemployment	Potential market (GDP)	Potential market (population)	Specialization in financial intermediation 1	Specialization in financial intermediation 2	Specialization in high tech clusters	R&D staff	Intensity of R&D	Specialization in educative clusters	Connectivity of households	Connectivity of enterprises	E-government spread
Variable code	sctr	mway	rway	air	infcl	east	ncuniv	obue	drop	longterm	empl	unempl	yuem	mark1	mark2	fin1	fin2	hightr	rd	rdi	educl	houselt	enter	egov
Orientation	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Negative	Negative	Negative	Negative	Negative	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive
Max	27.7	216.0	655.0	17.6	2.3	16,320.2	13.6	59.7	42.2	2,558.2	337,621.6	21,370,247.0	5.2	33,558,191.0	597,070.5	54.2	14.1	38.9	5.6	6.6	3.0	98.0	93.0	81.0
Min	1.1	0.0	0.0	0.0	0.0	1,859.6	0.3	0.1	0.0	36.9	10,254.2	2,439,020.0	0.6	1,337,321.0	10,250.0	0.4	0.0	0.9	0.1	0.1	0.0	0.0	34.0	7.0
Average	5.2	29.6	77.7	2.1	0.5	8,089.9	3.9	26.1	0.1	0.0	0.1	1.9	0.1	11,479,206.4	283,445.0	4.7	2.9	13.5	1.6	1.6	0.9	69.5	70.0	42.0
Standard deviation	3.8	39.5	78.8	3.9	0.3	3,955.9	3.0	8.9	0.1	0.0	0.2	2.5	0.0	5,700,596.5	194,158.8	4.2	1.9	5.4	1.0	1.3	0.6	15.9	12.3	15.6
Coefficient of variation	73%	133%	101%	190%	60%	49%	52%	34%	61%	139%	172%	132%	67%	50%	72%	90%	69%	40%	61%	82%	78%	22%	17%	37%
Asymmetry	3.7	2.1	4.2	3.3	0.6	-0.1	1.3	0.5	2.6	1.2	12.6	2.4	1.7	0.9	1.3	3.6	2.6	0.6	1.2	2.1	0.7	-0.9	-0.7	0.8
Correction of asymmetry?	yes	yes	yes	yes	no	no	yes	no	yes	yes	yes	yes	yes	no	yes	yes	yes	no	yes	yes	no	no	no	no

Source: Author

Figure 12. Uncertainty corridors*

	Central value	Min	Max
W71	0.600	0.500	0.700
W72	0.350	0.250	0.450
W73	0.050	0.000	0.100
W61	0.533	0.433	0.633
W62	0.375	0.275	0.475
W63	0.092	0.042	0.142
W51	0.467	0.367	0.567
W52	0.400	0.300	0.500
W53	0.133	0.033	0.233
W41	0.400	0.300	0.500
W42	0.425	0.325	0.525
W43	0.175	0.075	0.275
W31	0.333	0.233	0.433
W32	0.450	0.350	0.550
W33	0.217	0.117	0.317
W21	0.267	0.167	0.367
W22	0.475	0.375	0.575
W23	0.258	0.158	0.358
W11	0.200	0.100	0.300
W12	0.500	0.400	0.600
W13	0.300	0.200	0.400

Source: Author

*Note: W_{ij}, where *i* denotes category of development and *j* number of dimension group

Figure 13. Final results

Pays	NUTS 2	Code de région	Dimensions de base (score)	Dimensions d'efficacité (score)	Dimensions d'innovation (score)	**Score pondéré**	Ranking
Suède	Stockholm	SE11	1.3	0.8	1.7	**1.2**	1
Finlande	Helsinki-Uusimaa	FI1B	1.7	0.3	2.3	**1.2**	2
Suède	Västsverige	SE23	1.1	0.8	1.3	**1.0**	3
Danemark	Hovedstaden	DK01	0.9	0.9	1.2	**1.0**	4
Allemagne	Oberbayern	DE21	1.0	0.7	1.5	**1.0**	5
Pays-Bas	Gelderland	NL22	0.8	1.1	0.9	**1.0**	6
Pays-Bas	Noord-Holland	NL32	1.2	0.6	1.4	**0.9**	7
Suède	Sydsverige	SE22	1.1	0.5	1.4	**0.9**	8
Allemagne	Karlsruhe	DE12	0.7	1.0	1.1	**0.9**	9
Pays-Bas	Utrecht	NL31	1.0	0.8	1.0	**0.9**	10
Pays-Bas	Limburg (NL)	NL42	0.9	0.8	0.9	**0.9**	11
Allemagne	Darmstadt	DE71	1.1	0.5	1.4	**0.9**	12
Allemagne	Mittelfranken	DE25	0.8	0.7	1.2	**0.8**	13
Allemagne	Unterfranken	DE26	0.7	0.9	0.9	**0.8**	14
Suède	Östra Mellansverige	SE12	1.0	0.5	1.3	**0.8**	15
Autriche	Tirol	AT33	1.0	0.8	0.7	**0.8**	16
France	Île de France	FR10	0.7	1.1	0.4	**0.8**	17
Pays-Bas	Noord-Brabant	NL41	0.8	0.7	1.1	**0.8**	18
Allemagne	Tübingen	DE14	0.7	0.8	1.1	**0.8**	19
Belgique	Prov. Vlaams-Brabant	BE24	1.2	0.5	0.9	**0.8**	20
Allemagne	Stuttgart	DE11	0.8	0.6	1.2	**0.8**	21
Autriche	Niederösterreich	AT12	1.2	0.3	0.9	**0.8**	22
Royaume-Uni	Berkshire, Buckinghamshir	UKJ1	0.4	1.1	0.6	**0.8**	23
Pays-Bas	Zuid-Holland	NL33	0.8	0.7	0.9	**0.8**	24
Suède	Övre Norrland	SE33	1.0	0.4	1.2	**0.8**	25
Allemagne	Köln	DEA2	0.9	0.6	1.0	**0.8**	26
Royaume-Uni	Surrey, East and West Suss	UKJ2	0.6	0.9	0.8	**0.8**	27
Royaume-Uni	Inner London	UKI1	0.2	1.0	0.7	**0.7**	28
Autriche	Oberösterreich	AT31	1.0	0.5	0.8	**0.7**	29
Allemagne	Düsseldorf	DEA1	0.9	0.5	0.9	**0.7**	30
Allemagne	Schwaben	DE27	0.7	0.7	0.8	**0.7**	31
Allemagne	Kassel	DE73	0.7	0.7	0.7	**0.7**	32
Suède	Småland med öarna	SE21	1.0	0.4	1.0	**0.7**	33
Allemagne	Brandenburg	DE40	0.7	0.7	0.7	**0.7**	34
Allemagne	Arnsberg	DEA5	0.7	0.7	0.6	**0.7**	35
Allemagne	Münster	DEA3	0.7	0.8	0.5	**0.7**	36
Autriche	Steiermark	AT22	1.1	0.3	1.0	**0.7**	37
Allemagne	Rheinhessen-Pfalz	DEB3	0.7	0.6	0.8	**0.7**	38
Suède	Norra Mellansverige	SE31	1.0	0.5	0.7	**0.7**	39
Pays-Bas	Overijssel	NL21	0.7	0.5	0.9	**0.7**	40
Finlande	Pohjois- ja Itä-Suomi	FI1D	1.0	0.2	1.1	**0.7**	41
Danemark	Syddanmark	DK03	0.8	0.6	0.7	**0.7**	42
Danemark	Midtjylland	DK04	0.8	0.5	0.8	**0.7**	43
Allemagne	Gießen	DE72	0.7	0.6	0.8	**0.7**	44
Allemagne	Detmold	DEA4	0.7	0.6	0.7	**0.7**	45
Autriche	Salzburg	AT32	1.0	0.5	0.6	**0.7**	46
Allemagne	Freiburg	DE13	0.7	0.5	0.9	**0.6**	47
Allemagne	Oberpfalz	DE23	0.8	0.4	0.9	**0.6**	48
Pays-Bas	Flevoland	NL23	0.6	0.5	1.0	**0.6**	49
Danemark	Sjælland	DK02	0.8	0.5	0.4	**0.6**	50
Allemagne	Dresden	DED2	0.6	0.6	0.7	**0.6**	51
Royaume-Uni	Outer London	UKI2	0.6	0.8	0.5	**0.6**	52
Autriche	Kärnten	AT21	1.0	0.3	0.7	**0.6**	53
Allemagne	Koblenz	DEB1	0.7	0.5	0.6	**0.6**	54
Royaume-Uni	Bedfordshire and Hertford	UKH2	0.4	0.8	0.7	**0.6**	55
Allemagne	Niederbayern	DE22	0.7	0.4	0.9	**0.6**	56
France	Centre (FR)	FR24	1.3	0.3	-0.3	**0.6**	57
Autriche	Wien	AT13	1.0	0.2	1.0	**0.6**	58
France	Rhône-Alpes	FR71	0.4	1.0	-0.1	**0.6**	59
Danemark	Nordjylland	DK05	0.8	0.4	0.7	**0.6**	60
Allemagne	Thüringen	DEG0	0.7	0.5	0.6	**0.6**	61
Espagne	Comunidad de Madrid	ES30	0.4	0.8	0.4	**0.6**	62
Allemagne	Hamburg	DE60	0.8	0.1	1.2	**0.6**	63
Allemagne	Lüneburg	DE93	0.7	0.5	0.5	**0.6**	64
Allemagne	Leipzig	DED5	0.7	0.3	0.6	**0.6**	65
Finlande	Länsi-Suomi	FI19	1.0	0.0	1.1	**0.6**	66
Royaume-Uni	Essex	UKH3	0.5	0.6	0.7	**0.6**	67
Allemagne	Oberfranken	DE24	0.7	0.3	0.7	**0.5**	68
France	Midi-Pyrénées	FR62	0.4	0.8	0.3	**0.5**	69
Allemagne	Braunschweig	DE91	0.7	0.2	0.9	**0.5**	70
Allemagne	Berlin	DE30	0.7	0.2	1.0	**0.5**	71
Royaume-Uni	Hampshire and Isle of Wigl	UKJ3	0.4	0.8	0.6	**0.5**	72
Royaume-Uni	Kent	UKJ4	0.3	0.8	0.3	**0.5**	73
France	Bourgogne	FR26	0.3	1.1	-0.5	**0.5**	74
France	Languedoc-Roussillon	FR81	0.4	0.9	-0.3	**0.5**	75
Allemagne	Weser-Ems	DE94	0.7	0.3	0.5	**0.5**	76
Finlande	Etelä-Suomi	FI1C	0.8	0.2	0.6	**0.5**	77
Allemagne	Hannover	DE92	0.7	0.1	0.9	**0.5**	78
Allemagne	Bremen	DE50	0.7	-0.1	1.2	**0.5**	79
Allemagne	Schleswig-Holstein	DEF0	0.8	0.1	0.6	**0.5**	80
Pays-Bas	Zeeland	NL34	0.7	0.3	0.5	**0.5**	81
Allemagne	Mecklenburg-Vorpommeri	DE80	0.8	0.1	0.3	**0.5**	82
Pays-Bas	Groningen	NL11	0.9	0.1	0.7	**0.4**	83
Belgique	Prov. Brabant Wallon	BE31	0.7	0.0	1.0	**0.4**	84
France	Provence-Alpes-Côte d'Az	FR82	0.5	0.5	0.3	**0.4**	85
Allemagne	Saarland	DEC0	0.8	0.0	0.6	**0.4**	86
Allemagne	Sachsen-Anhalt	DEE0	0.6	0.2	0.4	**0.4**	87
Royaume-Uni	Eastern Scotland	UKM2	0.5	0.3	0.6	**0.4**	88
Allemagne	Trier	DEB2	0.7	0.1	0.6	**0.4**	89
Pays-Bas	Friesland (NL)	NL12	0.7	0.0	0.7	**0.4**	90
Pays-Bas	Drenthe	NL13	0.8	-0.2	0.8	**0.4**	91
Luxembourg	Luxembourg	LU00	1.6	-0.2	0.6	**0.4**	92
Slovaquie	Bratislavský kraj	SK01	-0.2	0.7	0.7	**0.4**	93
Rép. Tchèque	Praha	CZ01	0.1	0.4	0.8	**0.4**	94
Allemagne	Chemnitz	DED4	0.6	0.2	0.4	**0.4**	95
Royaume-Uni	Gloucestershire, Wiltshire	UKK1	0.5	0.1	0.8	**0.4**	96
Autriche	Burgenland (AT)	AT11	0.9	-0.2	0.3	**0.4**	97
Belgique	Prov. Oost-Vlaanderen	BE23	0.6	0.3	0.3	**0.4**	98
France	Alsace	FR42	0.4	0.4	0.1	**0.4**	99
Suède	Mellersta Norrland	SE32	1.0	-0.5	0.9	**0.4**	100
France	Picardie	FR22	0.3	0.6	-0.3	**0.4**	101
France	Champagne-Ardenne	FR21	0.3	0.8	-0.6	**0.4**	102
Belgique	Prov. West-Vlaanderen	BE25	0.6	0.3	0.0	**0.4**	103
Finlande	Åland	FI20	1.0	0.1	0.0	**0.3**	104
Belgique	Prov. Liège	BE33	0.8	0.0	0.1	**0.3**	105
Belgique	Prov. Antwerpen	BE21	0.6	0.1	0.5	**0.3**	106
Royaume-Uni	Leicestershire, Rutland an	UKF2	0.3	0.3	0.4	**0.3**	107
Royaume-Uni	Herefordshire, Worcesters	UKG1	0.3	0.4	0.3	**0.3**	108
France	Haute-Normandie	FR23	0.3	0.6	-0.3	**0.3**	109
France	Franche-Comté	FR43	0.3	0.5	-0.2	**0.3**	110
France	Auvergne	FR72	0.3	0.5	-0.3	**0.3**	111
Royaume-Uni	East Wales	UKL2	0.2	0.3	0.3	**0.3**	112
Belgique	Prov. Hainaut	BE32	0.6	0.3	0.3	**0.3**	113
Espagne	Cataluña	ES51	0.1	0.4	0.2	**0.3**	114
Belgique	Région de Bruxelles-Capit	BE10	0.6	0.0	0.4	**0.3**	115
Belgique	Prov. Limburg (BE)	BE22	0.5	0.1	0.3	**0.3**	116
Royaume-Uni	Derbyshire and Nottinghar	UKF1	0.2	0.3	0.2	**0.3**	117
Italie	Lombardia	ITC4	0.7	-0.1	0.6	**0.2**	118
Irlande	Southern and Eastern	IE02	0.6	-0.3	0.8	**0.2**	119
France	Aquitaine	FR61	0.4	0.2	-0.1	**0.2**	120
France	Limousin	FR63	0.4	0.2	-0.4	**0.2**	121
Italie	Emilia-Romagna	ITH5	-0.6	1.0	-0.3	**0.2**	122
Royaume-Uni	North Eastern Scotland	UKM5	0.4	-0.1	0.6	**0.2**	123
France	Bretagne	FR52	0.3	0.3	-0.3	**0.2**	124
Royaume-Uni	Northern Ireland (UK)	UKN0	0.5	-0.1	0.2	**0.2**	125
Royaume-Uni	East Anglia	UKH1	0.3	-0.1	0.5	**0.2**	126
Royaume-Uni	Shropshire and Staffordshi	UKG2	0.3	0.2	-0.3	**0.2**	127
Royaume-Uni	Greater Manchester	UKD3	0.3	-0.2	0.3	**0.2**	128
France	Basse-Normandie	FR25	0.3	0.3	-0.5	**0.2**	129
Royaume-Uni	West Yorkshire	UKE4	0.4	0.0	0.1	**0.2**	130
Royaume-Uni	Dorset and Somerset	UKK2	0.4	0.1	0.2	**0.2**	131
Royaume-Uni	North Yorkshire	UKE2	0.3	0.0	0.3	**0.2**	132
Italie	Piemonte	ITC1	-0.3	0.9	-0.3	**0.2**	133
France	Pays de la Loire	FR51	0.3	0.3	-0.3	**0.2**	134
Royaume-Uni	South Western Scotland	UKM3	0.5	-0.3	0.3	**0.2**	135
Belgique	Prov. Namur	BE35	0.3	-0.4	0.5	**0.1**	136
Espagne	Castilla y León	ES41	-0.1	0.6	-0.3	**0.1**	137
Espagne	Comunidad Valenciana	ES52	0.1	0.3	-0.1	**0.1**	138
Royaume-Uni	Highlands and Islands	UKM6	0.3	0.0	0.0	**0.1**	139
Royaume-Uni	Lancashire	UKD4	0.3	-0.1	0.1	**0.1**	140
Slovénie	Zahodna Slovenija	SI02	0.0	0.1	0.1	**0.1**	141
France	Lorraine	FR41	0.3	0.1	-0.4	**0.1**	142
Espagne	Aragón	ES24	-0.1	0.4	-0.2	**0.1**	143
Royaume-Uni	Cheshire	UKD6	0.1	0.0	0.1	**0.1**	144
Autriche	Vorarlberg	AT34	0.8	-0.6	0.5	**0.1**	145
France	Poitou-Charentes	FR53	0.2	0.1	-0.4	**0.1**	146
Italie	Lazio	ITI4	0.0	0.2	0.0	**0.1**	147
Irlande	Border, Midland and West	IE01	0.4	-0.4	0.3	**0.1**	148
Espagne	Illes Balears	ES53	0.2	-0.2	0.1	**0.0**	149
Royaume-Uni	South Yorkshire	UKE3	0.4	-0.3	0.0	**0.0**	150

Pays	NUTS 2	Code de région	Dimensions de base (score)	Dimensions d'efficacité (score)	Dimensions d'innovation (score)	**Score pondéré**	Ranking
Royaume-Uni	Devon	UKK4	0.3	-0.4	0.2	**0.0**	151
Royaume-Uni	Lincolnshire	UKF3	0.2	-0.1	-0.2	**0.0**	152
Royaume-Uni	West Midlands	UKG3	0.5	-0.6	0.5	**0.0**	153
Royaume-Uni	Cumbria	UKD1	0.3	0.0	-0.9	**0.0**	154
Royaume-Uni	Northumberland and Tyne	UKC2	0.3	-0.4	0.1	**0.0**	155
Espagne	Castilla-la Mancha	ES42	-0.2	0.4	-0.5	**0.0**	156
Espagne	Comunidad Foral de Navar	ES22	0.0	-0.1	0.1	**0.0**	157
Belgique	Prov. Luxembourg (BE)	BE34	0.3	-0.3	-0.4	**0.0**	158
Pologne	Mazowieckie	PL12	-0.4	0.5	0.0	**0.0**	159
France	Nord - Pas-de-Calais	FR30	0.3	-0.1	-0.5	**0.0**	160
Italie	Veneto	ITH3	-0.3	0.3	-0.5	**-0.1**	161
Espagne	Región de Murcia	ES62	-0.1	0.1	-0.3	**-0.1**	162
Royaume-Uni	East Yorkshire and Norther	UKE1	0.3	-0.5	-0.2	**-0.1**	163
Royaume-Uni	Merseyside	UKD7	0.1	-0.2	-0.1	**-0.1**	164
Estonie	Eesti	EE00	-0.3	0.1	0.3	**-0.1**	165
Royaume-Uni	Tees Valley and Durham	UKC1	0.3	-0.6	0.0	**-0.1**	166
Italie	Marche	ITI3	-0.4	0.2	-0.2	**-0.1**	167
Espagne	País Vasco	ES21	-0.1	-0.2	0.2	**-0.1**	168
Italie	Liguria	ITC3	-0.3	0.2	-0.4	**-0.1**	169
Portugal	Lisboa	PT17	0.1	-0.3	-0.2	**-0.1**	170
Slovénie	Vzhodna Slovenija	SI01	-0.2	-0.1	0.2	**-0.1**	171
Royaume-Uni	West Wales and The Valley	UKL1	0.3	-0.7	-0.1	**-0.1**	172
Espagne	Galicia	ES11	-0.1	-0.2	-0.3	**-0.2**	173
Italie	Valle d'Aosta/Vallée d'Aos	ITC2	-0.1	-0.3	0.0	**-0.2**	174
France	Corse	FR83	0.4	-0.7	-0.5	**-0.2**	175
Rép. Tchèque	Jihozápad	CZ03	-0.3	-0.1	-0.1	**-0.2**	176
Espagne	Principado de Asturias	ES12	-0.1	-0.3	-0.2	**-0.2**	177
Rép. Tchèque	Jihovýchod	CZ06	-0.3	-0.2	0.2	**-0.2**	178
Pologne	Lódzkie	PL11	-0.6	0.4	-0.6	**-0.2**	179
Espagne	Andalucía	ES61	-0.1	-0.4	-0.2	**-0.2**	180
Royaume-Uni	Cornwall and Isles of Scilly	UKK3	0.3	-0.8	-0.2	**-0.2**	181
Italie	Provincia Autonoma di Tre	ITH2	-0.5	-0.2	0.1	**-0.2**	182
Rép. Tchèque	Severovýchod	CZ05	-0.3	-0.2	0.0	**-0.3**	183
Espagne	Cantabria	ES13	-0.1	-0.5	-0.1	**-0.3**	184
Espagne	Extremadura	ES43	-0.3	-0.2	-0.6	**-0.3**	185
Rép. Tchèque	Střední Cechy	CZ02	-0.1	-0.7	0.1	**-0.3**	186
Italie	Toscana	ITI1	-0.3	-0.3	-0.4	**-0.3**	187
Italie	Molise	ITF2	-0.4	-0.2	-0.5	**-0.3**	188
Rép. Tchèque	Střední Morava	CZ07	-0.4	-0.2	-0.2	**-0.3**	189
Pologne	Swietokrzyskie	PL33	-0.6	0.2	-0.9	**-0.3**	190
Hongrie	Közép-Magyarország	HU10	-0.4	0.3	0.1	**-0.3**	191
Pologne	Dolnoslaskie	PL51	-0.5	0.0	-0.4	**-0.3**	192
Pologne	Slaskie	PL22	-0.5	-0.1	-0.5	**-0.3**	193
Italie	Umbria	ITI2	-0.4	-0.2	-0.7	**-0.3**	194
Pologne	Podlaskie	PL34	-0.6	0.1	-0.8	**-0.3**	195
Pologne	Opolskie	PL52	-0.6	0.1	-0.7	**-0.4**	196
Pologne	Malopolskie	PL21	-0.6	0.0	-0.4	**-0.4**	197
Lithuanie	Lietuva	LT00	-0.5	-0.2	-0.4	**-0.4**	198
Slovaquie	Západné Slovensko	SK02	-0.7	0.0	0.0	**-0.4**	199
Pologne	Lubelskie	PL31	-0.6	0.1	-0.7	**-0.4**	200
Italie	Provincia Autonoma di Bol	ITH1	-0.4	-0.4	-0.3	**-0.4**	201
Italie	Friuli-Venezia Giulia	ITH4	-0.4	-0.5	-0.2	**-0.4**	202
Espagne	La Rioja	ES23	-0.3	-0.6	-0.3	**-0.4**	203
Italie	Campania	ITF3	-0.4	-0.4	-0.4	**-0.4**	204
Pologne	Zachodniopomorskie	PL42	-0.5	-0.2	-0.7	**-0.4**	205
Pologne	Kujawsko-Pomorskie	PL61	-0.6	-0.1	-0.8	**-0.4**	206
Pologne	Wielkopolskie	PL41	-0.7	0.0	-0.4	**-0.4**	207
Rép. Tchèque	Moravskoslezsko	CZ08	-0.5	-0.5	-0.1	**-0.4**	208
Pologne	Lubuskie	PL43	-0.6	-0.2	-0.8	**-0.4**	209
Slovaquie	Stredné Slovensko	SK03	-0.6	-0.3	-0.2	**-0.5**	210
Portugal	Norte	PT11	-0.4	-0.5	-0.8	**-0.5**	211
Rép. Tchèque	Severozápad	CZ04	-0.3	-0.7	-0.5	**-0.5**	212
Pologne	Pomorskie	PL63	-0.6	-0.3	-0.5	**-0.5**	213
Hongrie	Dél-Alföld	HU33	-0.7	0.0	-0.7	**-0.5**	214
Espagne	Canarias (ES)	ES70	0.1	-1.3	-0.1	**-0.5**	215
Italie	Basilicata	ITF5	-0.5	-0.5	-0.4	**-0.5**	216
Italie	Abruzzo	ITF1	-0.4	-0.6	-0.6	**-0.5**	217
Grèce	Attiki	EL30	-0.3	-0.7	-0.6	**-0.5**	218
Lettonie	Latvija	LV00	-0.8	-0.1	-0.6	**-0.5**	219
Portugal	Algarve	PT15	-0.5	-0.5	-0.9	**-0.6**	220
Pologne	Podkarpackie	PL32	-0.7	-0.4	-0.4	**-0.6**	221
Portugal	Centro (PT)	PT16	-0.7	-0.2	-1.1	**-0.6**	222
Pologne	Warminsko-Mazurskie	PL62	-0.7	-0.4	-0.8	**-0.6**	223
Hongrie	Nyugat-Dunántúl	HU22	-0.7	-0.5	-0.5	**-0.6**	224
Italie	Puglia	ITF4	-0.4	-0.8	-0.8	**-0.6**	225
Slovaquie	Východné Slovensko	SK04	-0.5	-0.8	-0.2	**-0.6**	226
Portugal	Alentejo	PT18	-0.9	-0.2	-1.3	**-0.6**	227
Italie	Calabria	ITF6	-0.4	-1.0	-0.9	**-0.7**	228
Italie	Sicilia	ITG1	-0.3	-1.1	-0.8	**-0.7**	229
Hongrie	Közép-Dunántúl	HU21	-0.7	-0.6	-0.6	**-0.7**	230
Hongrie	Dél-Dunántúl	HU23	-0.7	-0.7	-0.7	**-0.7**	231
Hongrie	Észak-Magyarország	HU31	-0.8	-0.6	-0.7	**-0.7**	232
Croatie	Kontinentalna Hrvatska	HR04	-1.0	-0.3	-0.7	**-0.7**	233
Croatie	Jadranska Hrvatska	HR03	-1.0	-0.3	-0.7	**-0.7**	234
Roumanie	Bucuresti - Ilfov	RO32	-1.0	-0.4	-0.7	**-0.7**	235
Hongrie	Észak-Alföld	HU32	-0.8	-0.6	-0.8	**-0.7**	236
Bulgarie	Yugozapaden	BG41	-1.1	-0.1	-0.7	**-0.8**	237
Italie	Sardegna	ITG2	-0.4	-1.5	-0.1	**-0.8**	238
Grèce	Kentriki Makedonia	EL12	-0.8	-0.9	-1.1	**-0.8**	239
Grèce	Anatoliki Makedonia, Thra	EL11	-1.0	-1.2	-1.2	**-1.1**	240
Grèce	Notio Aigaio	EL42	-1.0	-1.1	-1.1	**-1.1**	241
Grèce	Kriti	EL43	-0.9	-1.5	-0.8	**-1.1**	242
Grèce	Voreio Aigaio	EL41	-1.1	-1.1	-1.0	**-1.1**	243
Grèce	Thessalia	EL14	-0.9	-1.3	-1.3	**-1.1**	244
Grèce	Dytiki Makedonia	EL13	-1.1	-1.2	-1.4	**-1.1**	245
Roumanie	Vest	RO42	-1.5	-0.5	-1.6	**-1.1**	246
Grèce	Ipeiros	EL21	-0.8	-1.6	-1.3	**-1.2**	247
Grèce	Dytiki Ellada	EL23	-0.9	-1.4	-1.3	**-1.2**	248
Roumanie	Nord-Vest	RO11	-1.5	-0.5	-1.8	**-1.2**	249
Grèce	Peloponnisos	EL25	-1.1	-1.2	-1.6	**-1.2**	250
Grèce	Sterea Ellada	EL24	-1.2	-1.1	-1.6	**-1.2**	251
Roumanie	Centru	RO12	-1.5	-0.5	-2.1	**-1.2**	252
Serbie	Beograd	SR1	-1.6	-0.6	-0.4	**-1.2**	253
Bulgarie	Severen tsentralen	BG32	-1.4	-0.9	-1.6	**-1.2**	254
Grèce	Ionia Nisia	EL22	-1.0	-1.6	-1.5	**-1.3**	255
Bulgarie	Yuzhen tsentralen	BG42	-1.3	-1.3	-1.7	**-1.3**	256
Bulgarie	Severoiztochen	BG33	-1.3	-1.3	-1.6	**-1.3**	257
Roumanie	Sud-Est	RO22	-1.7	-0.5	-2.6	**-1.3**	258
Roumanie	Nord-Est	RO21	-1.7	-0.6	-2.3	**-1.3**	259
Bulgarie	Severozapaden	BG31	-1.4	-1.1	-2.0	**-1.3**	260
Bulgarie	Yugoiztochen	BG34	-1.3	-1.5	-1.6	**-1.4**	261
Roumanie	Sud - Muntenia	RO31	-1.8	-0.7	-2.1	**-1.4**	262
Roumanie	Sud-Vest Oltenia	RO41	-1.7	-0.9	-2.1	**-1.4**	263
Serbie	Vojvodina	SR2	-2.0	-0.6	-1.3	**-1.5**	264
Serbie	Južna i Istočna Srbija	SR4	-1.8	-1.0	-1.6	**-1.5**	265
Monténégro	Crna Gora	ME00	-2.1	-1.1	-0.7	**-1.7**	266
Serbie	Šumadija i zapadna Srbija	SR3	-2.0	-1.3	-1.6	**-1.7**	267

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