AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Territorial Unbalances in Quality of Life. A focus on Italian Inner and Rural Areas

Bertolini P.[1,2], Pagliacci F.[1,2]

[1] Università di Modena e Reggio Emilia, Department of Economics "M. Biagi", Modena, Italy
[2] CAPP, Modena, Italy

francesco.pagliacci@unimore.it

Paper prepared for presentation at the 5th AIEAA Conference
"The changing role of regulation in the bio-based economy"

16-17 June, 2016
Bologna, Italy

Summary

The Italian National Strategy for Inner Areas explicitly draws policymakers' attention to inner municipalities. It stresses the importance of improving socio-economic conditions of people as the only way to reverse negative demographic trends in those areas. To this respect, improving quality of life (QoL) represents one of the key drivers. Given such an important policy implication, this work provides a statistical tool to measure existing gaps in QoL levels across Italian NUTS 3 regions, by explicitly disentangling urban and inner areas. Nevertheless, QoL is a multidimensional concept, thus a composite indicator is computed following a non-compensatory approach: the QoL Mazziotta-Pareto Index. Firstly, we consider the variability of the comprehensive indicator across Italy, with respect to the presence of inner areas. As a major result, this analysis seems breaking down the supposed negative relationship between QoL and presence of inner areas, which the paper proves to be mostly overlapping with rural ones, when controlling for sub-national structural divides occurring throughout Italy. Secondly, spatial aspects make the picture even more complex. Even the neighbouring space is expected to affect QoL at local level. In particular, by means of both global and local indicators of spatial autocorrelation, groups of NUTS 3 regions sharing similar QoL levels with their neighbours are detected. From a policy perspective, such a locked-in path among neighbouring regions can influence the effectiveness of place-based policies.

Keywords: inner areas, rural areas, quality of life, spatial effects
JEL Classification codes: O18; R00; R10; R11

Measuring Quality of Life and its Territorial Drivers across Italy. Which Role for Inner and Rural Areas?

Bertolini P. [1,2], Pagliacci F.[1,2]

[1] Università di Modena e Reggio Emilia, Department of Economics "M. Biagi", Modena, Italy
[2] CAPP, Modena, Italy

1. INTRODUCTION

Across European countries, geographical differences in terms of economic and social development may also affect Quality of Life (QoL). QoL is similar to the multidimensional concept of wellbeing, being function of people's life circumstances (MEA, 2005). Thus, it does not comprise just economic aspects (e.g., meeting people's basic material needs): it may also refer to social networks, people's health, their sense of worth and the sustainability of the environment on which they depend (Cagliero *et al.*, 2011; Costanza *et al.*, 2008; Petrosillo *et al.*, 2013). At EU level, QoL shows wide territorial unbalances, for instance among urban and rural areas (Eurofound 2014). It is not a case that even the EU Common Agricultural Policy has stressed the enhancement of the quality of life in rural areas as a major strategic target to be addressed by the Rural Development Programmes 2007-2013.

Nevertheless, when tackling QoL territorial unbalances, urban-rural divide is just part of the story. Even the concept of 'Inner Areas', which has been introduced by the Italian government, may play a role (Barca *et al.*, 2014). The idea behind this concept is rather simple: since the seminal work of Christaller (1933), cities and larger towns have always provided population with essential services (e.g. education, health, mobility). Thus, according to the model of economic growth that had occurred in Italy since the end of World War II, those urban hubs have been attracting more and more people also because of the variety of services they could offer (Barca *et al.*, 2014). Conversely, minor municipalities and other inner areas have started lagging behind: suffering from geographical (and economic) remoteness and being affected by negative demographic trends, they have been characterised by a steady deprivation of essential services, which, on its turn, has made the population decrease faster. These trends have led to some well-known economic and social negative effects such as: population abandonment and reduction of economic activities, disaggregation of the fabric of society, increasing costs in terms of land management. Despite the surge of counter-urbanization processes since the 1980s (Dematteis, 1986; OECD, 2009), most of rural and inner areas still suffer from the aforementioned negative economic and social effects (Bertolini *et al.*, 2008; Copus *et al*., 2015). In most cases, costs of those phenomena are paid by the country as a whole (Barca *et al.*, 2014). Thus, besides the traditional North-South socio-economic divides, other kinds of spatially-divergent dynamics affect Italy: typically, rural and inner municipalities are considered as weak areas. Thus, also local core-periphery patterns occur within the country.

All these dynamics urged the Italian government to launch a specific National Strategy for Inner Areas, whose first aim was to define inner areas properly. The strategy defines them as those municipalities

that, being located at some considerable distance from major urban poles, suffer from a limited provision of essential services. Nevertheless, they also share important rural and agricultural traits (Barca *et al.*, 2014).

Since its launch, this strategy has fuelled the attention of Italian policymakers towards the need for the improvement of social and economic conditions of people living within inner areas as the only way to reverse negative demographic trends there. Indeed, this is exactly one of the ultimate goals of this strategy, and QoL represents a key driver to assure it. Enhancing quality of life at local level together with assuring a good performance of local labour market and creating new forms of employment represent the only way to cut emigration from inner areas, by attracting new residents and raising the birth rate (Barca *et al.*, 2014).

Given these important policy implications, this paper tries answering some simple research questions. In particular, it aims to provide a statistical tool to assess and measure existing gaps in QoL levels across Italy, by explicitly disentangling urban and inner areas. Nevertheless, being QoL a multidimensional concept, its measurement poses three major methodological issues (OECD, 2008), which this paper explicitly tackles. Firstly, it points out the most appropriate territorial level to analyse these issues, according to available data. Secondly, a composite QoL indicator is computed, by following a non-compensatory approach (as suggested by Mazziotta and Pareto, 2010b): its variability across Italy is eventually assessed, with respect to the presence (and the relevance) of inner areas. Thirdly, the work also stresses the role of spatial spillovers in influencing QoL: indeed, even neighbouring provinces' features (both in terms of QoL and in terms of presence of inner areas) may affect overall outcomes.

The rest of the paper is organised as follows. Section 2 introduces the concept of inner areas, as defined by the Italian National Strategy for Inner Areas. Section 3 tackles the main measurement issues linked with defining inner areas: it returns some solutions to make possible the quantification of the importance of inner areas at NUTS 3 level, looking at relationships with rural regions. Section 4 provides a synthetic indicator of QoL, discussing main methodological approaches and returning main results. Main relationships between inner areas and QoL are pointed out as well. Section 5 focuses on spatial issues, by introducing into the analysis the role of spatial neighbourhood. Section 6 concludes the paper.

2. THE ITALIAN NATIONAL STRATEGY FOR INNER AREAS

In 2014, the Italian government launched the National Strategy for Inner Areas. It was mostly targeted to promote innovative projects within those municipalities located far away from major providers of the whole range of services that are now considered as essential constituents of the EU 'citizenship' (Barca *et al.*, 2014). Thus, this territorial classification focuses on the provision of those essential services: indeed, the geographical distance from the centres providing those services (namely, large cities) represents the main variable to classify different territorial areas.

Referring to service provision as a key element to classify the territory is not completely new approach: it has been firstly introduced in 2008 by the EU DG Inforegio, with the goal of better classifying rural areas in comparison to the official OECD classification, which had been mainly based on population density (Dijkstra and Poelman, 2008). Inforegio was mostly aimed at identifying remote rural regions throughout Europe, by considering those having the major risk of abandonment. That classification combines the OECD population criterion with an indicator of distance: it considers the driving time (namely 45 minutes) to reach a city of at least 50.000 inhabitants as a main centre of services. Compared to the Inforegio classification, this methodology does not consider rural conditions and the number of inhabitants of cities: it just focuses on the effective availability of services at municipal level. Actually, inner areas are mostly

defined in terms of their remoteness. Despite that, inner areas hide wide potentials. They actually represent a major source of environmental (e.g., water resources, forests, natural and human landscapes), cultural (historic settlements, small and rural museums, skills centres) and agricultural resources (Barca *et al.*, 2014).

Besides their cultural and environmental potential wealth, inner areas deserve a national strategy for many other reasons. According to the strategy, they represent 60% of the total land area and 25% of Italian population. Nevertheless, most of inner areas have been facing a steady process of marginalisation, followed by a pauperisation in the provision of basic services to population, in particular the essential ones, such as health, education and mobility. As a consequence, those areas are expected to increase their own marginalisation, boosting national social costs in terms of hydro-geological instability, degradation of both cultural and landscape heritage, decay and soil consumption. All those drawbacks clearly justify the launch of a national strategy (Barca *et al.*, 2014).

According to this framework, the National Strategy for Inner Areas is mostly aimed at improving their socio-economic conditions. Thus, both enhancing QoL and improving labour market performances represent key and effective means to reverse population decline, cut emigration of younger people and improve social and economic conditions of those areas (Barca *et al.*, 2014).

The strategy also moves from the idea that, despite common sense, some inner municipalities in both Northern and Southern regions have been able to implement good practices, over time. Thus, if inner areas' economic marginalisation does not represent an unavoidable process, the strategy just aims to spread the knowledge about those best practices, trying replicating them across Italy (Barca *et al.*, 2014). In most cases, they are built upon the promotion (and preservation) of local environment and local cultural resources.

To this respect, inner areas share many similarities with rural ones, not only in terms of weaknesses but also in terms of potential strengths. For instance, they both share plenty of area-specific agricultural productions, which originate from tight connections between the territory and local skills. It is not a case that inner areas are home for many typical productions (PDOs and PGIs), prompting local food industry[1] (Barca *et al.*, 2014). Given the existence of such a potential, studies on rural development have often singled out the emergence of positive tendencies (such as the increase in rural tourism and the diffusion of agriculture multifunctionality), which may prompt the development of both rural and inner areas (Hoggart *et al.* 1995; Paniagua 2012), overcoming traditional urban-rural economic divides (Pagliacci, 2014a).

Besides a radical change in its theoretical perspective, even the implementation of this strategy is innovative: it forces each Italian region to select a limited number of targeted areas. Although following nationally shared criteria[2], the initial phase of the strategy has been 'played out' in the neediest areas as identified by each region, according to a well-defined selective approach. The aim of this phase is defining and launching some pilot programmes, representing good practises that could apply to other regions as well. Furthermore, general priority is usually devoted to the acknowledgement of territorial safeguarding, valorisation of natural and cultural assets (namely sustainable tourism), agricultural activities, renewable energy and energy saving, handicraft and local knowledge.

[1] Foodstuffs represent cultural assets as they refer to local identities. Furthermore, new types of employment may originate, thanks to major changes in agro-food activities and in the distribution process (e.g., short supply chains; ethical purchasing groups, on-line sales with direct delivery to customers...). These changes may also affect environment, through the introduction of new and more sustainable ways of production (Barca *et al.*, 2014). Indeed, Common Agricultural Policy stresses cross-compliance as a key point (Matthews, 2013). Furthermore, even consumers may play a key role, thanks to their increasing awareness of those production techniques that guarantee food safety together with the reproduction and the rationalisation of employed natural resources (*water* and *carbon footprint*, biodiversity, animal wellbeing).

[2] The strategy actually maintains a strong national character, by referring to Special Programme Framework Agreements between local municipalities, regions and central public administrations take place (Barca *et al.*, 2014).

As underlined above, the enhancement of QoL at local level sits at the heart of the National Strategy for Inner Areas, being their socio-economic development the main aim of the strategy. In other words, QoL emerges as an important target of this strategy. Actually, when promoting local development, involving both economic growth and a greater social inclusion, it is necessary to deal with the enhancement of QoL. As already mentioned, the ultimate objective – and guiding light – of the strategy is reversing population trends in inner areas (namely, cutting out-migration, attracting new residents and raising overall birth rate). A reversal in demographic dynamics is acknowledged as a key factor to limit social costs linked to socio-economic marginalisation, hydrogeological instability and degradation of both human and environmental capital. Nevertheless, when dealing with such a demographic problem, QoL levels cannot be ignored: actually, they represent key drivers in people's settlement choices. It follows that assessing QoL divides between urban poles and inner areas represents a key issue, especially in helping policy makers in fine tuning their own policies (Barca *et al.*, 2012). Furthermore, QoL divides matter even within inner areas: despite some distinctive traits, inner areas are more and more polymorphic, having been affected by differentiated trajectories of development for decades (Barca *et al.*, 2014). Again, assessing different needs across different areas as well as different geographic patterns may represent a great improve to the strategy itself.

3. How Inner Are NUTS 3 Regions? Methodological Issues in the Measurement

3.1. Assessing the presence of inner areas at NUTS 3 level

When defining inner areas, a detailed and innovative methodology is provided in order to classify each Italian municipality. In fact, although inner areas definitions are clear, identifying their boundaries is not so trivial. While mapping and zoning have always represented challenging tasks for policy makers, Barca *et al.* (2012) suggest that any place-based policy would take great advantage of more accurate indicators of existing territorial differences.

Here, the identification of inner areas follows a specific procedure. Given the polycentric structure of Italy, firstly those municipalities acting as providers of services are defined; then other municipalities that gravitate around them, each of them with its own level of spatial remoteness, are singled out. In particular, three main theoretical assumptions drive this way of mapping inner areas (Barca *et al.*, 2014):

- the network of differentiated urban centres provides the whole range of essential services, generating catchment areas according to a gravitational models (Christaller, 1933);
- other minor municipalities' degree of spatial remoteness from this network may hinder social inclusion as well as QoL levels;
- inner areas are becoming more and more polymorphic, because of different time-space patterns.

From a methodological perspective, identification of inner areas is a two-step procedure. Firstly, Italian municipalities acting as service providers are defined as those municipalities (or groups of neighbouring municipalities) being able to provide simultaneously: i) a full range of secondary education; ii) at least one grade 1 emergency care hospital[3]; ii) at least one Silver category railway station[4]. When all these

[3] Grade 1 emergency care hospitals (DEA) include a set of operational units that, in addition to casualty departments, guarantee observation facilities, short stays, diagnostic-therapeutic general medical intervention, general surgery, orthopaedics and traumatology, cardiology intensive care. Refer to Barca *et al.* (2014) for further details.

[4] Here, railway stations represent a proxy for the more general provision of mobility services. In Italy, rail mobility has always played a key role in providing citizens access to other services and places: thus, it represents an essential service. In particular, Italian Rail Network (RFI) classifies railway stations according to the number of daily passengers and trains: it distinguishes platinum, gold,

services are provided, urban poles are detected[5]. Eventually, all remaining municipalities are classified into four different typologies: outlying areas; intermediate areas; peripheral areas and ultra-peripheral areas. Such a classification is based on spatial accessibility, by considering the number of minutes taken to get from each municipality to the nearest urban pole. Each band is computed on the tertile distribution of the distance in minutes from the nearest hub: thus, approximately 20 and 40 minutes are considered as thresholds. An additional band is introduced (>75 minutes, i.e. the 95th percentile) to identify ultra-peripheral municipalities (Barca *et al.*, 2014). Such a classification moves from the hypothesis that inner areas can be defined just through distance from services: no other socio-economic weaknesses but remoteness are adopted here. Eventually, moving from this six-typology classification, a broader definition of inner areas is provided by just putting together intermediate, peripheral and ultra-peripheral areas (Barca *et al.*, 2014). Given the general purposes of this work, here we refer to this simpler definition of inner areas.

Nevertheless, some methodological drawbacks are tied with such a definition. A first issue deals with the territorial level of the analysis. Inner areas are defined at municipality level, but no reliable QoL indicators are available at such a territorially-disaggregated level. At the maximum, any analysis can refer to the NUTS 3 level (i.e., 110 provinces). Thus, we have converted municipal data into NUTS 3 level data. To return robust results, the relevance of inner areas within each province is computed according to three alternative indicators. Firstly, raw number of municipalities is considered. Given the *i*-th province and its *n* municipalities, the inner-municipality indicator (I_i) is defined as follows:

$$I_i = \frac{\sum_{j=1}^{n} m_j}{n} \quad (1)$$

Where *j* is one of the *n* municipalities in the province *i* and the generic element m_j can take two different values: $m_j = 1$, when *j* is classified as either intermediate or peripheral or ultra-peripheral; $m_j = 0$, otherwise. Alternatively, both population and land area are considered. As in (1), given the *i*-th Italian province and its *n* municipalities, the inner-population indicator (IP_i) and the inner-area indicator (IA_i) are defined as follows:

$$IP_i = \frac{\sum_{j=1}^{n} (m_j P_j)}{\sum_{j=1}^{n} P_j} \quad (2)$$

$$IA_i = \frac{\sum_{j=1}^{n} (m_j A_j)}{\sum_{j=1}^{n} A_j} \quad (3)$$

Where *j* is one of the *n* municipalities in the province *i*, P_j is its population and A_j is its land area. Again, the generic element m_j can take two different values, as already specified in (1). Each indicator may range from 0 to 1: 0 stands for the absence of inner area; 1 stands for the absence of non-inner areas.

Figure 1 returns the values of each indicator at NUTS 3 level: Figure 1a maps I_i, Figure 1b maps IP_i, Figure 1c maps IA_i. Both Figure 1a and Figure 1c return similar patterns; when focusing on population, the share of inner areas at provincial level is generally lower. Just in a few Southern provinces, the share of population living in inner municipalities is above 50%, while Northern NUTS 3 regions share a lower share of inner areas than Southern ones. Exceptions are found across mountains areas.

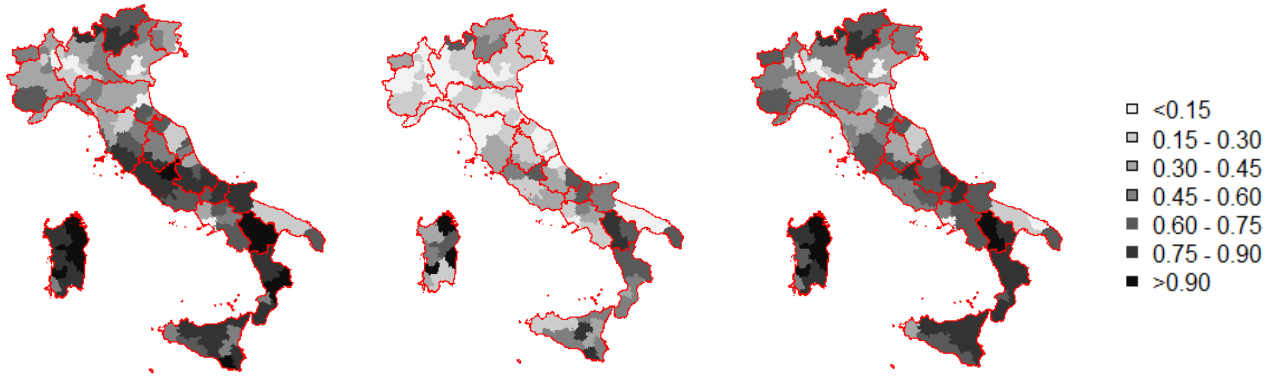
silver and bronze stations. Silver stations are medium/small, with an average degree of uptake for metropolitan/regional services and just a few long-distance journeys (Barca *et al.*, 2014).

[5] Among urban poles acting as services providers, all NUTS 3-level capital municipalities are included, although some of them do not provide all the aforementioned basic services. Furthermore, if the whole range of services is provided by a group of neighbouring municipalities, inter-municipal hubs are defined (Barca *et al.*, 2014).

Such a sharp North-South divide also emerges when looking at average values at regional level (Table 1). Among Italian regions, Liguria, Piedmont and Lombardy share the lowest shares of population living in inner municipalities (less than 12%). On the opposite side, in three Southern regions (i.e., Basilicata, Molise and Calabria) more than 55% of their population lives in inner areas. Thus, such a North-South divide should be always taken into account in the rest of the analysis.

Figure 1: Inner areas, share out of the total by NUST 3 region.

a) Inner municipalities (I_i) b) Inner population (IP_i) c) Inner land area (IA_i)



Source: authors' elaboration

Table 1: Inner areas, share out of the total by region.

	Regions	Inner municipalities (I_i)	Inner population (IP_i)	Inner land area (IA_i)
North-West	Piedmont	38.06%	11.70%	46.29%
	Aosta Valley	59.46%	30.50%	71.60%
	Lombardy	33.03%	10.69%	45.95%
	Liguria	43.83%	8.89%	50.52%
North-East	Trentino-Alto Adige	76.28%	44.93%	81.24%
	Veneto	33.05%	18.72%	38.06%
	Friuli-Venezia Giulia	39.45%	13.77%	53.79%
	Emilia –Romagna	41.95%	13.11%	42.84%
Centre	Tuscany	44.25%	13.10%	51.30%
	Umbria	61.96%	25.31%	48.51%
	The Marches	44.35%	14.77%	42.73%
	Latium	76.72%	28.06%	64.62%
South	Abruzzo	75.41%	37.05%	70.96%
	Molise	80.15%	61.11%	83.37%
	Campania	49.00%	14.70%	63.19%
	Apulia	54.26%	26.05%	44.92%
	Basilicata	96.18%	74.65%	92.32%
	Calabria	79.95%	55.21%	81.10%
The Islands	Sicily	74.62%	41.34%	73.36%
	Sardinia	84.35%	52.27%	84.54%
Italy		**51.72%**	**22.43%**	**59.77%**

Source: authors' elaboration

3.2. Inner Areas and other indicators of rurality

As already stressed, agricultural activities play a key role in shaping inner areas. Thus, the latter also share important rural traits (Barca *et al.*, 2014). Having computed NUTS 3 level indicators, we can compare

them with alternative indexes of rurality: Eurostat urban-rural typologies (Eurostat, 2010); the PRI indicator (Camaioni *et al*., 2013); the FRI indicator (Pagliacci, 2014a).

Each indicator is built on an alternative methodology, all of them referring to the whole EU-27. Eurostat (2010) defines urban-rural typologies according to population density and controlling for the presence of large cities. Such a single indicator is eventually collapsed into a discrete ordinal variable, returning three urban-rural typologies: predominantly urban (PU), intermediate (IR) and predominantly rural (PR) regions. Thus, it is too rough to capture increasing rural areas' polymorphism (Camaioni *et al.*, 2013).

The PRI (PeripheRurality Indicator) is computed by Camaioni *et al.* (2013). Following a multidimensional approach, they apply a conventional principal component analysis to a 24-variable dataset (covering socio-demographic features, economic structure, land use, remoteness). Then, an ideal urban benchmark (i.e., a region being extremely urban in Europe) is identified and statistical distances between any other EU region and this benchmark are computed (Camaioni *et al.*, 2013). So, for each region, the PRI returns jointly the extent of rurality and peripherality.

Eventually, the FRI (Fuzzy Rurality Indicator) largely stresses the concept of urban-rural continuum. It applies fuzzy logic to six input variables (covering role of agriculture, population density and landscape/use of land) and it returns a final output (i.e., the FRI) and two intermediate outputs (Role of Agriculture and Natural Landscape). Indicators range from 0 to 1, where 0 stands for completely urban; 1 stands for completely rural (Pagliacci, 2014a).

The statistical relationship between indicators of inner areas and indicators of rurality can be assessed by means of Pearson correlation coefficients. Table 2 returns the correlation between I_i, IP_i, IA_i respectively and the aforementioned three indicators of rurality computed for Italian NUTS 3 regions[6]. In any specification, correlations are positive and statistically significant. Coefficients are larger for the FRI than for the PRI, although the latter also assesses NUTS 3 regions remoteness (thus, a concept pretty similar to the one referring to inner areas). Similar findings emerge when looking at the presence of inner municipalities among different Eurostat urban-rural typologies. Point-biserial correlation between each dummy variable and the presence of inner areas is consistent with expectations: indeed, correlation is positive for PR regions (inner areas' share is larger in PR regions than in non-PR ones), and it is negative for both PU and IR ones. When comparing average shares of inner areas among three typologies, similar evidence is returned: One-Way ANOVA (Analysis of Variance) tests whether average values are statistically different or not. Preliminarily, Levene's Test is computed to test whether groups' variances are equal.[7] These tests show statistically significant differences in any specification.

Thus, looking at these findings, a clear relationship between rural and inner areas emerges: despite alternative definitions, those NUTS 3 regions showing larger shares of inner areas are also more rural than other Italian areas. Thus, we can say National Strategy for Inner Areas implicitly refers to rural areas, as well.

[6] Here, just 107 observations are considered, as neither PRI nor FRI values are available for Monza and Brianza, Fermo, Barletta-Andria-Trani. Actually, those provinces were just instituted in 2004.

[7] It tests the null hypothesis that groups' variances are equal. If they are, simple F test for the equality of means in a One-Way ANOVA is performed; otherwise, Welch (1951) method is adopted.

Table 2: Relationships between the three inner indicators and indicators of rurality (PRI, FRI, Urban-rural typology) (p-values in parenthesis).

	I_i	IP_i	IA_i
Pearson correlation coefficients:			
PRI (Camaioni *et al.*, 2013)	0.522*	0.560*	0.487*
	(0.000)	(0.000)	(0.000)
FRI (Pagliacci, 2014a)	0.657*	0.601*	0.638*
	(0.000)	(0.000)	(0.000)
Point-biserial correlation:			
Urban-rural typology:			
PR regions	0.471*	0.538*	0.421*
	(0.000)	(0.000)	(0.000)
IR regions	-0.242*	-0.269*	-0.248*
	(0.012)	(0.005)	(0.010)
PU regions	-0.291*	-0.341*	-0.218*
	(0.002)	(0.000)	(0.024)
Avg. comparison:			
Avg. PR regions	0.689	0.461	0.677
Avg. IR regions	0.459	0.224	0.478
Avg. PU regions	0.343	0.112	0.407
Levene's test	0.182	6.608*	0.318
	(0.834)	(0.002)	(0.728)
One-way ANOVA	17.919*	31.324*	12.871*
	(0.000)	(0.000)	(0.000)

* Statistically significant at the 5% level

Source: authors' elaboration

4. QoL: Defining a Multidimensional Concept

4.1. Applying the Mazziotta-Pareto Index

QoL represents a multidimensional concept (MEA, 2005), including both economic aspects and social-relational ones (Cagliero *et al.*, 2011; Costanza *et al.*, 2008; Petrosillo *et al.*, 2013). Thus, measuring QoL may be even harder than measuring the presence of inner areas: it requires the construction of a composite and multidimensional index, which represents a challenging effort, for both scholars and policy makers (OECD, 2008; Mazziotta and Pareto, 2014).

When specifically focusing on QoL as a multidimensional phenomenon, both 'objective' and 'subjective' aspects play a role. The former dimension refers to physical and health status, personal income, local standards of living and any other information gathered by national and regional institutions on a routine basis (Malkina-Pykh and Pykh, 2008; Petrosillo *et al.*, 2013). The latter one focuses on individuals' subjective experience of their lives (Land, 1996) as well as psychological responses (e.g., life and job satisfaction and personal happiness). Assessing them is rather difficult: indicators referring to individual's perceptions have to be obtained just by means of sociologic surveys and investigations (Shin and Johnson, 1978). Thus, although the European Foundation for the Improvement of Living and Working Conditions follows a subjective approach in carrying out surveys on the level of quality of life across Europe (e.g., Eurofound, 2014), here we decided not to include any subjective measures of QoL, as they are not available at NUTS 3 level. Rather, this analysis relies on objective indicators of QoL.

When focusing on this perspective, a wide literature has discussed the theoretical debate about the main drivers of QoL at sub-national level. In particular, urban-rural divides have been widely investigated (see for instance Cagliero *et al.*, 2011; Florida *et al.*, 2013; Shucksmith *et al.*, 2009; Sørensen, 2014).

Nevertheless, the most cited QoL indicator, available in Italy at NUTS 3 level, is the one provided by the financial newspaper "Il Sole 24 Ore". Every year, it returns a QoL indicator based on 36 single variables, grouped into six different thematic areas (economic wealth, business activities and employment, services and environment, population, crime, leisure). Despite its popularity, this indicator suffers from some drawbacks. Firstly, it assumes perfect substitutability among original variables (i.e., a good performance in a thematic area may compensate a bad performance in another one). Secondly, different standard deviations among each variable affect the final outcome[8] (Mazziotta and Pareto, 2010a; 2010b; 2016). Lastly, the set of original variables changes every year: this makes impossible to assess time comparisons.

To avoid aforementioned drawbacks, an alternative indicator is adopted here. In particular, the Mazziotta-Pareto Index (MPI) is well consolidated in assessing QoL at local level. The MPI is a non-linear composite index, which transforms individual variables into a standardized indicator. It sums original data up, using arithmetic mean but adjusting it by a 'penalty' coefficient, which is related to the variability observed for each unit (Mazziotta and Pareto, 2016). Accordingly, those observations showing unbalanced values of the initial variables are penalised, according to a non-compensatory perspective (Mazziotta and Pareto, 2010a; 2016). In particular, here we adopt the following methodology to compute a QoL MPI. Firstly, original variables standardisation occurs. Let's consider the original matrix **X**, whose generic element is x_{ij}. It has n rows (observations) and m columns (variables), which are grouped into p thematic areas. From **X**, a standardised matrix **Z** is computed (Mazziotta and Pareto, 2010a), whose generic element z_{ij} is alternatively defined as follows:

$$z_{ij} = 100 + \frac{x_{ij} - M_{x_j}}{S_{x_j}} 10 \tag{4}$$

$$z_{ij} = 100 - \frac{x_{ij} - M_{x_j}}{S_{x_j}} 10 \tag{5}$$

Where: $M_{x_j} = \frac{\sum_{i=1}^{n} x_{ij}}{n}$ and $S_{x_j} = \sqrt{\frac{\sum_{i=1}^{n} (x_{ij} - M_{x_j})^2}{n}}$

In particular, we apply equation (4) to those indicators that are concordant in sign with the QoL MPI; otherwise, equation (5) is applied. Accordingly, p sub-indicators of QoL are computed, each of them referring to a thematic area. Given h thematic areas, each of them comprising k variables, the h-th sub-indicator of QoL is given by:

$$\bar{z}_{ih} = \frac{\sum_{j=1}^{k} z_{i,k(h-1)+j}}{k} \tag{6}$$

The p sub-indicators ($\bar{z}_{ih}$) are then grouped together and a QoL MPI is returned as:

$$MPI_i = M_{\bar{z}_i} - S_{\bar{z}_i} cv_{\bar{z}_i} \tag{7}$$

Where:

$$M_{\bar{z}_i} = \frac{\sum_{h=1}^{p} \bar{z}_{ih}}{p}, \quad S_{\bar{z}_j} = \sqrt{\frac{\sum_{h=1}^{p} (\bar{z}_{ih} - M_{\bar{z}_i})^2}{p}}, \quad cv_{\bar{z}_i} = \frac{S_{\bar{z}_i}}{M_{\bar{z}_i}}$$

The $S_{\bar{z}_i} cv_{\bar{z}_i}$ product represents the most innovative aspect of this approach, aimed at penalising those units showing unbalanced values of the p thematic sub-indicators (Mazziotta and Pareto, 2016). In addition,

[8] This distortion comes from the fact that the synthetic indicator is always computed through distances from a benchmark (i.e. the best performing NUTS 3 region).

due to the standardisation provided by (4) or (5), each indicator's mean is 100 and each standard deviation is 10 (Mazziotta and Pareto 2010; Aiello and Attanasio, 2004).

Here, this methodology is applied to a set of 28 original variables, retrieved for each of 110 Italian NUTS 3 regions. They refer to seven different thematic areas linked to QoL:

- Wealth & economic competitiveness (3 indicators),
- Services (3 indicators),
- Labour market (5 indicators),
- Neighbourhood safety (3 indicators),
- Population (7 indicators),
- Leisure (2 indicators),
- Environment & Energy (5 indicators).

Thematic areas partially overlap with those provided by 'Il Sole 24 Ore'. Nevertheless, original variables are open data published by the Open Coesione (OC) dataset: thus, we assure full comparability of results across time. Table 3 clearly specifies the source of data, which in most cases is Istat, and reference years: with the only exception of a few indicators, all data refer to years 2010 – 2014.

4.2. QoL and its sub-indicators: main territorial patterns

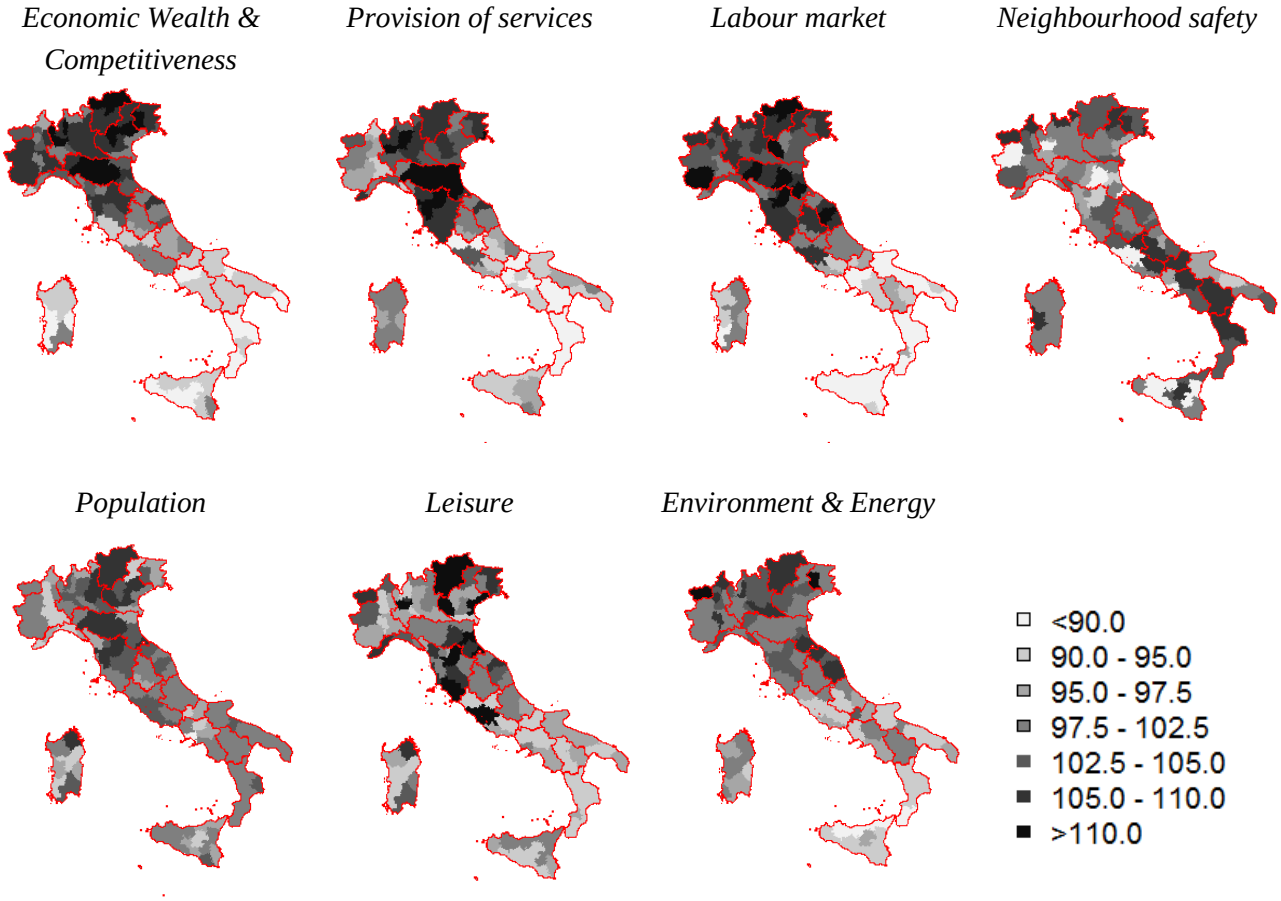
According to the aforementioned set of variables, seven different sub-indicators of QoL are returned. Each sub-indicator shows standardised values. Figure 2 shows the values of each sub-indicator across Italian provinces. Wealth and economic competitiveness show a strong North-South divide, confirming larger QoL in the North of the country. Throughout Southern regions and the Islands, just Ragusa and Cagliari show local values which are close to the national average. The provision of services is at a maximum in the provinces of Emilia-Romagna and Tuscany, due to a long-lasting attention to these political items (Bripi *et al*., 2011; Giordano and Tommasino, 2011). On the opposite side, education and health services are particularly poor across Southern Regions (e.g., Molise, Basilicata and Calabria), but even in some provinces close to Rome. As expected, labour market performance is poor in Southern provinces. On the opposite side, the best performances occur throughout the provinces of the so-called Third Italy (Bagnasco, 1977; 1988), namely in the North-East and alongside the Adriatic. Neighbourhood safety shows a less sharp North-South divide: in fact, best performances are observed across mountain provinces (across both the Alps and the Apennines). On the opposite side, metropolitan and urban provinces show poorer performances than rural areas. Population sub-indicator shows a good performance across Emilia-Romagna and Trentino-Alto Adige. Nevertheless, even in this case, Southern regions seem not lagging behind Northern ones, despite a lower presence of foreign people. Leisure activities show a scattered pattern across Italy. Nonetheless, urban areas and many Northern and Central Italian regions perform above the Italian average. Lastly, when focusing on environment and energy, local performance is good across North-East NUTS 3 regions as well as in the Aosta Valley. In the South, Sicily and Calabria show bad performances, whereas other inner NUTS 3 perform generally better.

Table 3: List of input variables, by thematic area.

Variable	Definition	Effect on QoL	Year	Source
Economic wealth & Competitiveness				
Per capita GVA (€)	Gross Value Added (current prices) per inhabitants, all sectors	+	2013	Istat
Per capita Export (€)	Exports per inhabitants	+	2014	Istat (OC)
Per capita Patents	Patents registered to the European Patent Office, per million inhabitants	+	2011	Istat on Eurostat data (OC)
Provision of services				
Diffusion of pre-school services	% of municipalities out of the total adopting pre-school services (e.g. nursery schools)	+	2012	
Children 0-3 attending day care and pre-school	% of young children (aged 0-3 years) who use day care facilities and other pre-school services	+	2012	Istat (OC)
Health emigration ratio	Share of the out-migration in hospital in other regions out of total hospital admissions	-	2013	
Labour market				
Employment rate	Employed persons (aged 15-64) over the number of people 15-64 (%)	+	2014	
Elderly people employment rate	Employed persons (aged 55-64) over the number of people 55-64 (%)	+	2014	
Youth unemployment rate	Unemployed persons (aged 15-24) over the number of persons 15-24 in the labour force (%)	-	2014	Istat (OC)
Unemployment rate	Unemployed persons (aged 15+) over the number of persons (aged 15+) in the labour force (%)	-	2014	
Gender differences	Differences in % points between male and female employment rates	-	2014	
Neighbourhood safety				
Rate of thefts	Number of recorded thefts per a thousand inhabitants	-	2013	
Rate of robberies	Number of recorded robberies per a thousand inhabitants	-	2013	Istat on Ministero Interno, Dipartimento Pubblica Sicurezza data (OC)
Rate of homicides	Number of recorded intentional homicides per 100 thousand inhabitants	-	2013	
Population				
Population Density	Inhabitants per km^2	-	2014	
Old-Age dependency ratio	Ratio of older dependents (people aged 65+) to the working-age population (15-64)	-	2014	
Ageing Index	Number of persons aged 65+ per hundred persons under age 15	-	2014	
Internal net migration rate	Difference of immigrants and emigrants within the country in a year, divided per 1000 inhabitants	+	2014	
External net migration rate	Difference of immigrants and emigrants (from/to abroad) in a year, divided per 1000 inhabitants	+	2014	Istat
Life expectancy at birth, males	Number of years a new-born male infant would live (assuming no changes in patterns of mortality throughout its life)	+	2014	
Life expectancy at birth, females	Number of years a new-born female infant would (assuming no changes in patterns of mortality throughout its life)	+	2014	
Leisure				
Live theatre and live music performances	Tickets sold to live theatre and live music performances, per 100 inhabitants	+	2007	Istat on SIAE data (OC)
Tourists	Number of overnight stays spent by national and foreign tourists in tourist accommodations, per inhabitant	+	2013	Istat (OC)
Environment and energy				
Water use efficiency	% of water distributed to customers out of the total volume introduced into the municipality water network	+	2008	Istat (OC)
Waste recycling	Share of municipal waste recycled out of total solid waste (%)	+	2014	Istat on ISPRA
Renewable energy	% of GWh renewable energy to total energy production in GWh	+	2010	data (OC)
Air quality monitoring network	Number of control stations of the air quality monitoring network, per 100 thousands inhabitants	+	2012	Istat - Open Coesione
Discontinuity of electricity supply	Number of long-lasting interruptions in electricity supply (average number per single customer)	-	2014	Istat on Autorità Energia elettrica, Gas, Sistema idrico data (OC)

Source: author's elaboration

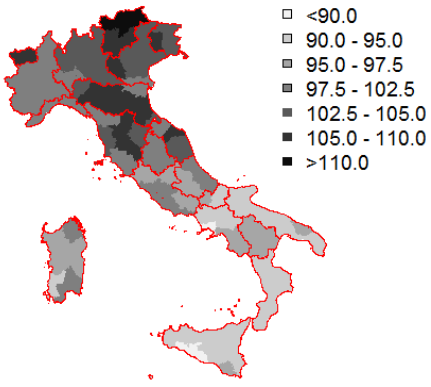
Figure 2: Sub-indicators of QoL, by NUST 3 region.



Source: authors' elaboration

Moving from the seven aforementioned sub-indicators, a comprehensive QoL MPI is computed. As already mentioned, it penalises those NUTS 3 regions that show more unbalanced performances across sub-indicators. Figure 3 returns main results: Bolzano shows the highest level of the index (>110); Trento and Florence rank second and third, respectively. Furthermore, most of Northern provinces share above-the-average levels of QoL MPI, while Southern ones generally lag behind. The worst performance is got by Agrigento (Sicily): the Sicilian province is followed by Naples and Caserta (both in Campania).

Figure 3: MPI of QoL, by NUST 3 region.



Source: authors' elaboration

Nevertheless, returning a ranking of provinces (which may change over time) is not the ultimate goal of this work. Rather, in the following sections, we aim to analyse existing correlations between the presence of inner areas and QoL.

4.3. QoL and inner areas: main relationships

Preliminarily, the analysis of Pearson correlation coefficients makes possible the assessment of the main relationship between QoL levels and the presence of inner areas at NUTS 3 level (Table 4). Data at national level seem to be clear: with the only exception of neighbourhood safety, which shows a positive relation with the presence of inner areas, all other QoL dimensions are negatively correlated to the presence of inner areas: thus, the larger the presence of inner areas at NUTS 3 level, the lower the level of QoL. These results seem suggesting Italian inner areas generally suffer from low levels of QoL: thus, the launch of a national strategy targeted to them is definitely good news. Furthermore, as shown in Section 3, given the aforementioned relationship between the presence of both inner and rural areas, same results are expected to hold even with respect to the rural part of the country.

Table 4: Pearson correlation coefficients between inner areas indicators and indicators of QoL (p-values in parenthesis).

	I_i	IP_i	IA_i
Economic Wealth & Competitiveness	-0.504*	-0.534*	-0.443*
	(0.000)	(0.000)	(0.000)
Provision of services	-0.523*	-0.518*	-0.478*
	(0.000)	(0.000)	(0.000)
Labour Market	-0.405*	-0.465*	-0.352*
	(0.000)	(0.000)	(0.000)
Neighbourhood safety	0.310*	0.350*	0.314*
	(0.001)	(0.000)	(0.001)
Population	-0.112	-0.200*	-0.071
	(0.245)	(0.036)	(0.459)
Leisure	-0.213*	-0.298*	-0.193*
	(0.025)	(0.002)	(0.043)
Environment & Energy	-0.370*	-0.388*	-0.294*
	(0.000)	(0.000)	(0.002)
QoL MPI	-0.420*	-0.470*	-0.357*
	(0.000)	(0.000)	(0.000)

* Statistically significant at the 5% level

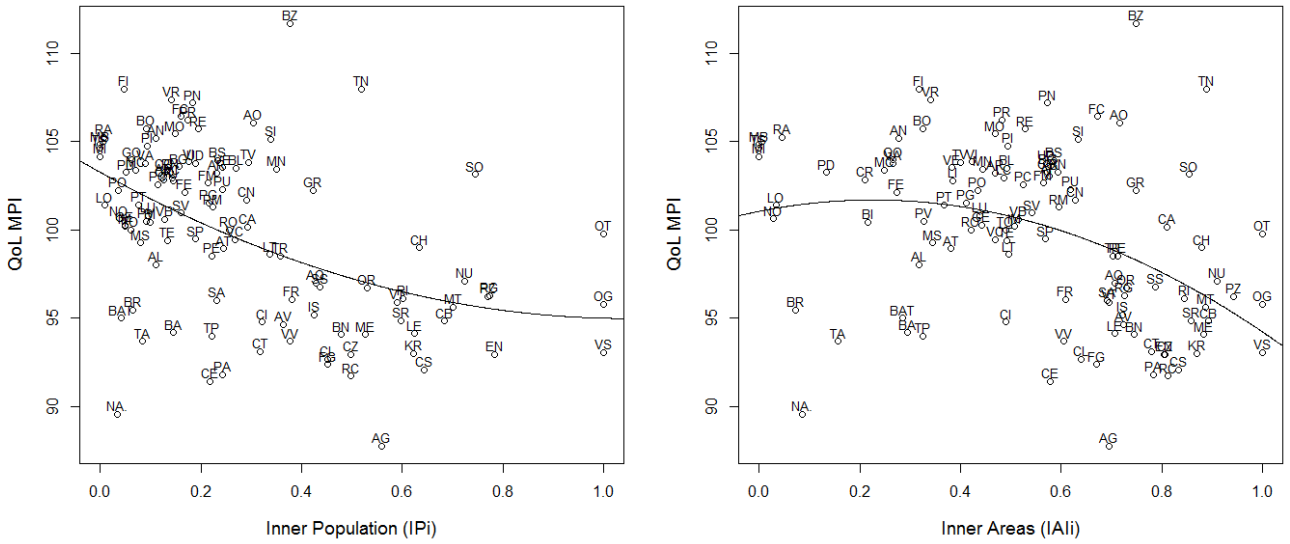
Source: authors' elaboration

Nevertheless, same data may hide some more complex patterns. In particular, two issues arise: i) non-linearity in the relationship and ii) different patterns at sub-national level.

To appreciate non-linearity, let's just focus on the synthetic QoL MPI. Figure 4 returns the scattered plots that link together the QoL MPI and the share of inner areas, according to both population and total area at NUTS 3 level. Different patterns emerge. When considering the share of population living in inner areas (IP_i,), the negative relationship with QoL is mostly confirmed. Nevertheless, when taking into account total areas (IA_i), best performing NUTS 3 regions are those combining both urban poles and more inner areas (namely those provinces showing intermediate levels of the IA_i indicator). Actually, an inverted "U-shaped" relationship seems occuring[9]. Thus, in Italy, both inner NUTS 3 regions and very urban ones tend to show lower levels of QoL.

[9] In each case, introducing a non-linear relation (i.e., $y = x^2+x$) rather than a linear one improves estimates in terms of R^2 values.

Figure 4: Non-linearity in the relationship between inner areas indicators (IP_i and IA_i) and QoL MPI.



Source: authors' elaboration

Nonetheless, non-linearity is just part of the story. A second issue to be taken into account refers to the differences in the patterns observed at sub-national level. Indeed, in Section 3 we have just pointed out the fact that on average Southern Italian regions show a larger presence of inner areas than Northern ones. Thus, this sharp North-South divide could affect overall results in terms of QoL MPI. Accordingly, it could be useful to disentangle previous results by macro-groups of regions. For sake of simplicity, here we refer to the classification provided in Table 1 (North-West, North-East, Centre, South, the Islands): Table 5 shows Person correlation coefficients per sub-indicator and per group of regions.

When disentangling by group of regions, most of differences between urban poles and inner areas seem disappearing. In particular, the negative relationship between inner areas and QoL does no longer hold. In fact, just a few sub-indicators appear to be statistically related to QoL:

- North-West: a positive relation between the sub-indicator Neighbourhood safety and the presence of inner areas occurs. Actually, the presence of large and unsafe metropolitan areas plays a role.
- North-East: service provision is negatively tied to the presence of inner areas at NUTS 3 level, when considering total population. Nevertheless, both 'population' and 'environment and energy' are positively related to the presence of inner areas, as well as the QoL MPI.
- Centre: a negative relation between QoL and the presence of inner areas affects many sub-indicators of QoL (e.g. economic wealth, service provision, labour market, environment and energy). The only sub-indicator that is positively related to the presence of inner areas is neighbourhood safety.
- South: a negative relationship emerges when considering service provision and inner areas; on the contrary, safety is positively associated with a larger presence of inner areas.
- The islands: at NUTS 3 level, relationships between QoL and presence of inner areas are never significant.

Thus, these data simply confirm inner areas' polymorphism: when controlling per single macro-region, strikingly different results emerge. In the North-East, inner areas do not lag behind urban poles when referring to QoL MPI, whereas opposite findings occurs when focusing on Central NUTS 3 regions. Thus, these findings seem supporting the choice made by the national strategy about the implementation of a place-based policy in accordance with regional governments: such a strategy seems to be more appropriate when dealing with specific problems, which may occur locally.

Table 5: Pearson correlation coefficients between inner areas indicators and indicators of QoL by macro-regions (p-values in parenthesis).

		Wealth & Competitiveness	Services	Labour Market	Neighbourhood Safety	Population	Leisure	Environment & Energy	QoL MPI
North-West	I_i	-0.388	-0.237	0.088	0.493*	-0.186	-0.016	0.062	-0.018
		(0.056)	(0.254)	(0.676)	(0.012)	(0.373)	(0.938)	(0.768)	(0.930)
	IP_i	-0.218	-0.114	0.177	0.551*	-0.082	-0.098	0.274	0.170
		(0.295)	(0.588)	(0.398)	(0.004)	(0.697)	(0.640)	(0.185)	(0.418)
	IA_i	-0.362	-0.145	0.04	0.464*	-0.100	0.021	0.074	0.048
		(0.075)	(0.488)	(0.850)	(0.019)	(0.633)	(0.922)	(0.726)	(0.820)
North-East	I_i	0.212	-0.363	0.267	0.083	0.491*	0.181	0.587*	0.430*
		(0.344)	(0.097)	(0.230)	(0.713)	(0.020)	(0.421)	(0.004)	(0.046)
	IP_i	0.017	-0.487*	0.115	0.407	0.317	0.148	0.428*	0.334
		(0.941)	(0.022)	(0.609)	(0.060)	(0.151)	(0.510)	(0.047)	(0.129)
	IA_i	0.175	-0.378	0.239	0.177	0.452*	0.156	0.597*	0.423*
		(0.437)	(0.083)	(0.284)	(0.432)	(0.035)	(0.489)	(0.003)	(0.050)
Centre	I_i	-0.663*	-0.630*	-0.504*	0.295	-0.451*	-0.193	-0.428*	-0.623*
		(0.001)	(0.002)	(0.017)	(0.182)	(0.035)	(0.390)	(0.047)	(0.002)
	IP_i	-0.697*	-0.703*	-0.538	0.496*	-0.421	-0.376	-0.454*	-0.672*
		(0.000)	(0.000)	(0.010)	(0.019)	(0.051)	(0.084)	(0.034)	(0.001)
	IA_i	-0.549*	-0.533*	-0.421	0.279	-0.324	-0.294	-0.238	-0.531*
		(0.008)	(0.011)	(0.051)	(0.208)	(0.142)	(0.184)	(0.287)	(0.011)
South	I_i	0.082	-0.529*	0.306	0.642*	0.194	-0.251	0.083	0.177
		(0.704)	(0.008)	(0.146)	(0.001)	(0.363)	(0.236)	(0.700)	(0.408)
	IP_i	-0.021	-0.584*	0.179	0.670*	0.071	-0.380	0.047	0.045
		(0.923)	(0.003)	(0.402)	(0.000)	(0.740)	(0.067)	(0.826)	(0.836)
	IA_i	0.070	-0.573*	0.358	0.682*	0.207	-0.331	0.158	0.199
		(0.745)	(0.003)	(0.086)	(0.000)	(0.333)	(0.114)	(0.462)	(0.352)
The Islands	I_i	0.091	0.229	0.476	0.264	-0.068	0.12	0.034	0.333
		(0.729)	(0.376)	(0.053)	(0.306)	(0.794)	(0.646)	(0.896)	(0.192)
	IP_i	-0.107	0.138	0.310	0.219	-0.120	-0.07	0.171	0.180
		(0.684)	(0.597)	(0.225)	(0.398)	(0.646)	(0.792)	(0.513)	(0.488)
	IA_i	0.222	0.221	0.421	0.080	-0.090	0.327	-0.059	0.279
		(0.391)	(0.394)	(0.093)	(0.759)	(0.731)	(0.200)	(0.821)	(0.279)

* Statistically significant at the 5% level

Source: authors' elaboration

5. THE ROLE OF THE NEIGHBOURING S

Italian provinces are characterised by a narrow extension: on average, the surface of an Italian province is 2 745 km^2, i.e. a square whose side is just 52 km. According to these figures, we cannot ignore the fact that people live, work and spend part of their own leisure time across neighbouring provinces. Thus, it could be misleading to focus any analysis on QoL at NUTS 3 level just on the relationships between it and socio-economic features in the same NUTS 3 region. In fact, even the characteristics of neighbouring provinces may affect QoL levels, having an impact on people's everyday life[10]. To this respect, two major characteristics of neighbouring provinces should be taken into account: the extent of QoL and the presence of either inner areas or urban poles. Let's consider two effects separately.

5.1. Spatial autocorrelation: QoL across neighbouring provinces

The simplest way to assess the QoL differentials across neighbouring observations is represented by the analysis of global and local indicators of spatial autocorrelation. According to the first law of geography (Tobler, 1970), specific statistical methodologies are implemented to highlight patterns of spatial association,

[10] A similar idea was originally suggested and tested by Pagliacci (2014b), in a preliminary analysis on QoL patterns across urban and rural Italian provinces. Nonetheless, that work simply considered the rough indicator returned by "Il Sole 24 Ore".

by formally measuring the degree of dependency among observations within a given geographic space (Anselin 1988; 1995). Firstly, global Moran's I statistics tests for the presence of spatial dependence. Moran's I test is a synthetic measure of global spatial autocorrelation, which is computed as follows (Moran, 1950; Cliff and Ord, 1981):

$$I = \frac{n}{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}} \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}(y_i - \bar{y})(y_j - \bar{y})}{\sum_{i=1}^{n}(y_i - \bar{y})^2}, \ \forall i, j \in N \tag{8}$$

where y_i and y_j are observations of a given variable in locations *i* and *j*, and w_{ij} is the generic element of a (*n* x *n*) row-standardized spatial weights matrix (**W**) defined as follows:

$$w_{ij} = \frac{w_{ij}^*}{\sum_{j=1}^{n} w_{ij}^*} \tag{9}$$

The generic element w_{ij}^* in (9) can take two alternative values: $w_{ij}^* = 1$ if $i \neq j$ and $j \in N(i)$; $w_{ij}^* = 0$ if $i = j \, or \, i \neq j \, and \, j \notin N(i)$, where $N(i)$ is the set of neighbours of the *i*-th region. $N(i)$, thus **W**, can be identified in several alternative ways. Literature has emphasized the fact there is no univocal preferable specification of **W** (Anselin, 1988). Despite alternative suitable weight matrices (e.g. those based on the nearest neighbours), here **W** is a *first-order queen contiguity matrix*. Thus, two regions are considered as neighbours only if they share a common boundary or vertex (Anselin, 1988). On average, each observation shows 4.45 neighbouring regions[11].

This row-standardized spatial weights matrix (**W**) allows computing global Moran's I statistic (thus their degree of spatial dependency) on both the QoL MPI and other sub-indicators of QoL. According to a global approach, it returns the degree of overall linear association between a vector of observed values and the spatially weighted averages of neighbouring observations. Thus, it does not allow the detection of specific regional structures of spatial autocorrelation (i.e., either spatial cluster or spatial outliers): to do that, local approaches in the analysis of spatial association may help. As a local indicator of spatial association, here we adopt Local Indicator of Spatial Association – LISA (Anselin 1995; Anselin *et al.*, 1996): it is similar to the global Moran's I statistic, but it is region-specific. It tests the hypothesis of random distribution by comparing values in specific locations and values in their neighbourhood (as defined by **W**). Local Moran's statistics returns the distribution of local spatial clusters, which are groups of neighbouring locations showing signicant LISA values. At a given significance level, such as 1%, it is possible to detect five alternative cases (Anselin, 1995): i) *Hot spots* (locations with high values and similar neighbours); ii) *Cold spots* (locations with low values and similar neighbours); iii) *Spatial outliers* (locations with high values but with low-value neighbours); iv) *Spatial outliers* (locations with low values but with high-value neighbours); v) Locations with no significant local autocorrelation.

Table 6 returns the values for both the global and the local Moran's I statistics, computed for both sub-indicators of QoL and the QoL MPI itself. A positive spatial autocorrelation occurs for all indicators but neighbourhood safety. The question thus becomes whether this general tendency to clustering yields to some given spatial clusters or not. The analysis on the LISA values returns information about spatial clusters in larger detail. Table 6 returns the number of NUTS 3 regions within each of the aforementioned five typologies of regions (at a 1% level of significance). Results are straightforward. In all cases, no spatial

[11] Most of Italian NUTS3 regions show either 4 or 5 neighbours. Nevertheless, the least connected province has just 1 neighbour, whereas the most connected one has 9 neighbours.

outliers are detected (confirming the sharp tendency to a positive spatial autocorrelation of observed values). In particular, neighbourhood safety and leisure are characterised by a fewer numbers of both hot and cold spots, whereas economic wealth, service provision and environment are much more clustered in space. Referring to the QoL MPI, 10 NUTS 3 regions are defined as hot spots, thus they benefit from large QoL levels even across their neighbourhood. Conversely, in 20 cases, low QoL levels are reinforced by bad performances even across neighbouring provinces.

Table 6: Global Moran's I statistics (p-value in parenthesis) and Local Moran's I statistics (number of NUTS 3 regions within each typology).

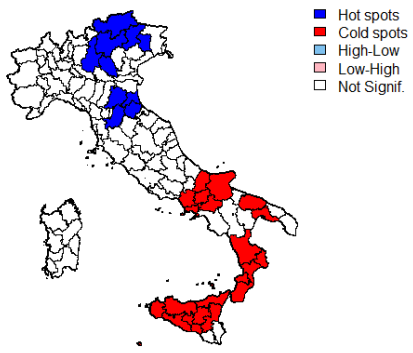
	Global Moran's I	Local Moran's I (LISA)			
	Moran's I	Hot spots (1)	Cold spots (2)	Spatial outliers (3 & 4)	No local autocorrelation (5)
Wealth	0.678* (0.000)	14	11	0	85
Services	0.763* (0.000)	16	13	0	81
Labour Market	0.809* (0.000)	6	23	0	81
Neighborhood Safety	0.057 (0.152)	0	3	0	107
Population	0.289* (0.000)	7	6	0	97
Leisure	0.215* (0.000)	5	0	0	105
Environment	0.630* (0.000)	7	14	0	89
MPI	0.802* (0.000)	10	20	0	80

* Statistically significant at the 5% level

Source: authors' elaboration

For the sake of simplicity, Figure 5 just maps the spatial clusters occurring when considering the comprehensive QoL MPI. It is easy to notice that hot spots are mostly located across North-Eastern Italy and partially among Central regions, returning two separated group of provinces. Thus, the North-East emerges as the best area of the country in terms of QoL levels. Conversely, cold spots cover most of Southern regions, from Campania and Apulia to Calabria and Sicily. In particular, the presence of neighbouring NUTS 3 regions sharing similar QoL MPI low values may reinforce their lags compared to Northern Italy. It may have a negative impact on dynamic performances as well.

Figure 5: Hot and cold spots – QoL MPI.



Source: authors' elaboration

5.2. Neighbouring inner areas and neighbouring urban poles: an opposite effect

In analysing spatial effects among neighbouring NUTS 3 regions, levels of QoL MPI just represent part of the story. In fact, the presence of either inner areas or larger urban poles across neighbouring provinces may play an additional role in explaining differences in QoL levels across the country. To assess it, we refer to the same spatial weights matrix (**W**) shown in section 5.1, in order to return the spatial lags of the aforementioned indicators of inner areas (I_i, IP_i, IA_i):

$$wI_i = \sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij} I_i \quad \forall i, j \in N \tag{10}$$

$$wIP_i = \sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij} IP_i \quad \forall i, j \in N \tag{11}$$

$$wIA_i = \sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij} IA_i \quad \forall i, j \in N \tag{12}$$

where w_{ij} is always defined as in (9).

Table 7 returns Pearson's correlation coefficients between QoL indicators and wI_i, wIP_i, wIA_i, at NUTS 3 level. Overall national data may hide same North-South divides already pointed out. Data disentangled by group of regions provide more insightful findings. In the North-West, no indicators of QoL are correlated with the spatially-lagged share of inner areas. In the North-East, both the population sub-indicator and the environment-energy one are positively linked to the presence of inner areas in neighbouring NUTS 3 regions. More in general, the QoL MPI as a whole shows a positive correlation with inner areas across the neighbourhood. On the contrary, across Central regions, most relationships are negative. As observed in advance, even the share of inner areas across the neighbourhood shows a negative correlation with economic wealth, service provision, environment and energy. Thus, in this group of regions, the presence of neighbouring inner areas plays a detrimental effect on QoL. Therefore, this divide seems increasing QoL differentials as well. In Southern regions, the presence of urban poles in the neighbourhood seems to have a positive effect just on the provision of services. Same relationship is perfectly reversed in the Islands, where the share of inner areas in the neighbourhood plays a positive effect also on labour market performances, environment and energy and the QoL MPI as a whole.

Again, with the only exception of NUTS 3 regions in the Centre, in most groups of regions the share of inner areas in the neighbourhood is positively related to QoL. Thus, if inner areas do not show high levels QoL, their presence in the neighbouring space surely plays a more positive role, thanks to positive spillovers.

Table 7: Pearson correlation coefficients between spatially-lagged indicators of inner areas and indicators of QoL, by macro-region (p-values in parenthesis)

		Wealth & Competitiveness	Services	Labour Market	Neighbourhood Safety	Population	Leisure	Environment & Energy	QoL MPI
Italy	wI_i	-0.629*	-0.569*	-0.583*	0.136	-0.155	-0.222*	-0.524*	-0.575*
		(0.000)	(0.000)	(0.000)	(0.157)	(0.105)	(0.020)	(0.000)	(0.000)
	wIP_i	-0.615*	-0.546*	-0.637*	0.155	-0.150	-0.234*	-0.552*	-0.583*
		(0.000)	(0.000)	(0.000)	(0.106)	(0.117)	(0.014)	(0.000)	(0.000)
	wIA_i	-0.604*	-0.537*	-0.562*	0.167	-0.216*	-0.195*	-0.494*	-0.546*
		(0.000)	(0.000)	(0.000)	(0.079)	(0.024)	(0.041)	(0.000)	(0.000)
North-West	wI_i	-0.403*	-0.122	-0.356	0.221	-0.379	0.024	-0.800	-0.246
		(0.046)	(0.560)	(0.091)	(0.288)	(0.062)	(0.910)	(0.704)	(0.235)
	wIP_i	-0.070	0.252	-0.274	0.192	0.121	-0.101	0.027	0.140
		(0.739)	(0.224)	(0.184)	(0.357)	(0.565)	(0.629)	(0.898)	(0.503)
	wIA_i	-0.367	-0.057	-0.262	0.296	-0.378	-0.008	-0.014	-0.157
		(0.071)	(0.787)	(0.207)	(0.150)	(0.063)	(0.968)	(0.946)	(0.453)
North-East	wI_i	0.192	-0.403	0.191	0.028	0.599*	0.358	0.570*	0.496*
		(0.391)	(0.063)	(0.395)	(0.902)	(0.003)	(0.102)	(0.006)	(0.019)
	wIP_i	0.161	-0.510*	0.190	0.353	0.385	0.387	0.514*	0.534*
		(0.475)	(0.015)	(0.397)	(0.107)	(0.077)	(0.075)	(0.014)	(0.010)
	wIA_i	0.176	-0.406	0.270	0.109	0.479*	0.510*	0.526*	0.580*
		(0.433)	(0.061)	(0.224)	(0.630)	(0.024)	(0.015)	(0.012)	(0.005)
Centre	wI_i	-0.448*	-0.581*	-0.411	0.293	-0.367	-0.138	-0.524*	-0.526*
		(0.036)	(0.005)	(0.057)	(0.186)	(0.092)	(0.539)	(0.012)	(0.012)
	wIP_i	-0.436*	-0.491*	-0.373	0.155	-0.347	-0.024	-0.523*	-0.480*
		(0.043)	(0.020)	(0.087)	(0.491)	(0.114)	(0.917)	(0.012)	(0.024)
	wIA_i	-0.439*	-0.553*	-0.460*	0.249	-0.446*	-0.127	-0.605*	-0.561*
		(0.041)	(0.008)	(0.031)	(0.265)	(0.037)	(0.574)	(0.003)	(0.007)
South	wI_i	0.059	-0.482*	0.268	0.210	0.132	0.028	-0.097	-0.008
		(0.786)	(0.017)	(0.205)	(0.325)	(0.538)	(0.897)	(0.651)	(0.972)
	wIP_i	-0.173	-0.533*	-0.001	0.243	0.213	-0.174	-0.152	-0.177
		(0.418)	(0.007)	(0.997)	(0.253)	(0.317)	(0.415)	(0.477)	(0.408)
	wIA_i	0.075	-0.436*	0.252	0.120	0.002	0.030	-0.032	-0.041
		(0.726)	(0.033)	(0.234)	(0.578)	(0.993)	(0.889)	(0.883)	(0.850)
The Islands	wI_i	0.068	0.500*	0.694*	0.331	0.125	0.448	0.707*	0.703*
		(0.795)	(0.041)	(0.002)	(0.195)	(0.632)	(0.071)	(0.002)	(0.002)
	wIP_i	0.394	0.570*	0.587*	0.274	0.194	0.451	0.465	0.688*
		(0.118)	(0.017)	(0.013)	(0.287)	(0.455)	(0.069)	(0.060)	(0.002)
	wIA_i	0.126	0.500*	0.644*	0.633*	-0.017	0.311	0.654*	0.770*
		(0.631)	(0.041)	(0.005)	(0.006)	(0.948)	(0.224)	(0.004)	(0.000)

* Statistically significant at the 5% level

Source: authors' elaboration

6. CONCLUSIONS

Through the improvement of both social and economic conditions of people living in Italian inner areas, the National Strategy for Inner Areas ambitiously aims to reverse negative demographic trends, which still affect most of them. To this respect, improving QoL represents a key issue (Barca *et al.*, 2014) not only for inner areas but also for rural ones. Indeed, the paper has singled out a large overlapping between rural and inner areas in Italy. Moving from this framework, this analysis has partially broken up the negative relationship between presence of inner/rural areas and local QoL levels. Such a result is suggested by the analysis of the QoL Mazziotta-Pareto Index, a composite indicator of QoL, computed at NUTS 3 level. In particular, taking into account different sub-indicators of QoL (such as neighbourhood safety, labour market, leisure), the paper has analysed each of them separately. Results are quite interesting, especially when controlling for sub-national structural divides occurring throughout Italy. When taking them into account, expected negative relationships between inner/rural areas and QoL is softened. For instance, when just focusing on North-Eastern regions, a larger share of inner areas at NUTS 3 level is associated to higher level

of QoL. Furthermore, even neighbourhood safety (a key driver of QoL) is generally larger in more inner/rural NUTS 3 regions than in urban ones.

If it is hard to find conclusive results about the relationship between inner areas and QoL (which in most cases is not linear, as well), spatial aspects make the picture even more complex. People may spend part of their lives out of their own province, thus even neighbourhood space is expected to matter when dealing with QoL. Here, main results strongly support this idea. Both QoL sub-indicators and QoL MPI show a positive spatial autocorrelation. Furthermore, it is possible to detect groups of regions whose neighbours share similar QoL levels. It follows that even the local development may be influenced by neighbouring regions' development, showing a kind of spatially locked-in paths. Thus, spatial spillovers are expected to affect place-based policies, which may be more or less effective, according to each region's neighbouring space. The same holds true when considering the presence of inner areas among neighbouring regions: for instance, this work proves that being located close to a province with a higher share of inner areas could have positive effects on QoL, especially in the North-East and in the South.

Thus, this analysis returns a clear picture about inner areas' polymorphism. Indeed, some of them show much socio-economic potential, even with respect to some specific sub-indicators of QoL, while others still lag behind. In particular, the 'innermost' areas in the South are the weakest ones, throughout Italy. Such a finding has important policy implications, even with respect to the National Strategy for Inner Areas. The top-down decision, carried out by the Italian central government, to focus on inner areas' development has been relevant. Nevertheless, it is important to maintain the decision-making process partially decentralised, in order to identify the most appropriate policy tools to be implemented and the neediest areas to be targeted.

Besides these considerations, this paper points out the effectiveness of the innovative approach chosen by the National Strategy for Inner Areas, which highlights territorial unbalances in terms of people's needs rather than territorial features. Indeed, just the provision of essential services to the population is seen as the main engine for local development, now and in the future. Such an approach would allow both scholars and policymakers to go beyond traditional urban-rural divides, which in fact are mostly considered by EU policies (such as the Rural Development Policy). Although providing partially overlapping results, a focus on inner areas seems stressing inter-sectoral policies as the best answer to overcome territorial divides and to cope with population changes, both in Italy and in the EU.

REFERENCES

Aiello, P. and Attanasio, M. (2004) How to Transform a Batch of Single Indicators to Make Up a Unique One? *Atti della XLII riunione scientifica della Società Italiana di Statistica* (Sessioni plenarie e specializzate): 327-338.

Anselin, L. (1988), *Spatial Econometrics: Methods and Models*. Dordrecht: Kluwer Academic Publishers.

Anselin, L. (1995), Local Indicators of spatial association – LISA. *Geographical Analysis*, 27: 93-115.

Anselin, L., Bera, A.K., Florax, R.J.G.M., and Yoon, M.J. (1996), Simple diagnostic tests for spatial dependence, *Regional Science and Urban Economics*, 26: 77-104.

Bagnasco, A. (1977), *Tre Italie: la problematica territoriale dello sviluppo economico italiano*. Bologna: Il Mulino.

Bagnasco, A. (1988), *La costruzione sociale del mercato.* Bologna: Il Mulino.

Barca, F., McCann, P. and Rodríguez-Pose, A. (2012), The Case for Regional Development Intervention: Place-Based versus Place-Neutral Approaches. *Journal of Regional Science* 52(1): 134-152.

Barca, F., Casavola, P. and Lucatelli, S. (eds.) (2014), A strategy for inner areas in Italy: definition, objectives, tools and governance. *Materiali Uval Series* 31.

Bertolini, P., Montanari, M., Peragine, V. (2008) Poverty and Social Exclusion in Rural Areas. Bruxelles: European Commission.

Bripi, F., Carmignano, A. and Giordano, R. (2011), La qualità dei servizi pubblici in Italia. *Occasional Paper* 84. Roma: Bankitalia.

Cagliero, R., Cristiano, S., Pierangeli, F. and Tarangioli, S. (2011), Evaluating the Improvement of Quality of Life in Rural Areas. Paper presented at 122nd EAAE Seminar. Ancona (Italy), 17-18 February.

Camaioni, B., Esposti, R., Lobianco, A., Pagliacci, F. and Sotte, F. (2013), How rural the EU RDP is? An analysis through spatial funds allocation. *Bio-based and Applied Economics* 2(3): 277–300.

Christaller, W. (1933), *Die zentralen Orten in Süddeutsch-Land*. Jena: Gustav Fischer.

Cliff, A. and Ord, J.K. (1981), *Spatial processes: Models and applications*. London: Pion.

Copus, A., Melo, P.C., Kaup, S., Tagai, G. and Artelaris, P. (2015), Regional poverty mapping in Europe – Challenges, advances, benefits and limitations. *Local Economy*. DOI: 10.1177/0269094215601958.

Costanza, R., Fisher, B., Ali, S., Beer, C., Bond, L., Boumans, R., Danigelis, N.L., Dickinson, J., Elliott, C., Farley, J., Elliott Gayer, D., MacDonald Glenn, L., Hudspeth, T.R., Mahoney, D.F., McCahill, L., McIntosh, B., Reed, B., Turab Rizvi, A., Rizzo, D.M., Simpatico, T. and Snapp, R. (2008), An Integrative Approach to Quality of Life Measurement, Research, and Policy. *S.A.P.I.EN.S.* 1(1). Online since 19.12.08. http://sapiens.revues.org/169.

Dematteis, G.(1986), Urbanization and counter - urbanization in Italy**,** *Ekistics*, 53 (316/317): 26-33.

Dijkstra, L. and Poelman, H. (2008), Remote Rural Regions. How proximity to a city influences the performance of rural regions, *Regional Focus*, 1.

Eurofound (2014), *Quality of life in urban and rural Europe*. Luxembourg: Publications Office of the European Union.

Eurostat (2010), A revised urban-rural typology. In Eurostat, Eurostat regional yearbook 2010. Luxembourg: Publications Office of the European Union: 240-253.

Florida, R., Mellander, C. and Rentfrow, P.J. (2013), The Happiness of Cities, *Regional Studies* 47(4): 613-627.

Giordano, R. and Tomasino, P. (2011), Public sector efficiency and political culture, *Working papers Bankitalia*, 786. Roma: Bankitalia.

Hoggart, K, Buller, H. and Black, R. (1995), *Rural Europe; Identity and Change*. London: Edward Arnold.

Land, K.C. (1996), Social indicators and the quality of life: where do we stand in the mid-1990s? *SINET* 45: 5-8.

Lucatelli, S., Carlucci, C. and Guerrizio M.A. (2013), A Strategy for the 'Inner Areas' of Italy. Proceedings of the 2nd EURUFU (Education, Local Economy and Job Opportunities in Rural Areas) Scientific Conference. Asti (Italy), 8 October.

Malkina-Pykh, I.G. and Pykh, Y.A. (2008). Quality-of-life indicators at different scales: theoretical background, *Ecological Indicators* 8: 854-862.

Matthews, A. (2013), Greening Agricultural Payments in the EU's Common Agricultural Policy. *Bio-based and Applied Economics* 2(1): 1-27.

Mazziotta, M. and Pareto, A. (2010a), La sintesi degli indicaotri di qualità della vita: un approccio non compensativo. Paper presented at "Congresso Qualità della vita. Riflessioni, studi e ricerche in Italia", Firenze, Italia.

Mazziotta, M. and Pareto, A. (2010b), Measuring quality of life: an approach based on the non-substitutability of indicators, *Statistica e Applicazioni* 8(2): 169-180.

Mazziotta, M. and Pareto, A. (2015). On a Generalized Non-compensatory Composite Index for Measuring Socio-economic Phenomena. Social Indicators Research, DOI 10.1007/s11205-015-0998-2

Mazziotta, M. and Pareto, A. (2016), Methods for Constructing Non-compensatory Composite Indices: A Comparative Study, *Forum for Social Economics*, 45(2-3): 213-229.

Millennium Ecosystem Assessment (MEA) (2005), *Ecosystems and Human Wellbeing.* Washington, DC: Island Press.

Moran, P.A.P. (1950), Notes on continuous stochastic phenomena, *Biometrika* 37: 17–23.

OECD (2008), *Handbook on Constructing Composite Indicators. Methodology and user guide*. Paris: OECD Publications

OECD (2009), *OECD Rural Policy Reviews: Italy*. Paris: OECD Publications.

Pagliacci, F. (2014a), Are EU Rural Areas still Lagging behind Urban Areas? An Analysis through Fuzzy Logic. Paper presented at 3rd AIEAA Conference, "Feeding the Planet and Greening Agriculture: Challenges and opportunities for the bio-economy", 25-27 June, 2014, Alghero, Italy.

Pagliacci, F. (2014b), L'erba del vicino è davvero più verde? Un'analisi sulla qualità della vita nelle province urbane e rurali, *AgriRegioniEuropa*, 10(39): 54-57.

Paniagua, A. (2012), The Rural as a Site of Recreation: Evidence and Contradictions in Spain from a Geographical Perspective. *Journal of Tourism and Cultural Change* 10(3): 264-275.

Petrosillo, I., Costanza, R., Aretano, R., Zaccarelli, N. and Zurlini, G. (2013), The use of subjective indicators to assess how natural and social capital support residents' quality of life in a small volcanic island, *Ecological Indicators* 24:, 609-620.

Shin, D.C. and Johnson, D.M. (1978), Avowed happiness as an overall assessment of the quality of life, *Social Indicators Res*. 5: 475-492.

Shucksmith, M., Cameron, S., Pichler, F. and Merridew, T. (2009), Urban-rural differences in Quality of Life across the EU, *Regional Studies* 43(10): 1275-1289.

Sørensen, J.F. (2014), Rural–urban differences in life satisfaction: Evidence from the European Union. *Regional Studies* 48(9): 1451-1466.

Tobler, W. R. (1970), A computer movie simulating urban growth in the Detroit region, *Economic Geography* 46: 234–240.

Welch, B.L. (1951), On the comparison of several mean values: an alternative approach. *Biometrika* 38: 330–336.