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Full Research Article

Quality of life and territorial imbalances. A focus on italian inner and rural areas

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Abstract. The Italian National Strategy for Inner Areas stresses the importance of improving socio-economic conditions of people as the only way to reverse negative demographic trends in those areas. In this respect, improving quality of life (QoL) may represent a key driver. This work provides a statistical tool to measure existing gaps in QoL levels across Italian NUTS 3 regions, by focusing on inner areas. Being QoL a multidimensional concept, a composite indicator is computed following a non-compensatory approach: the QoL Mazziotta-Pareto Index. Firstly, we consider the variability of this indicator across Italy, with respect to the presence of inner areas. This analysis breaks down the supposed negative relationship between QoL and presence of inner areas, which the paper proves to be mostly overlapping with rural ones, by controlling for sub-national structural divides. Secondly, spatial aspects make the picture more complex. Neighbourhood affects QoL at local level and through 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, locked-in paths among neighbouring regions can influence the effectiveness of place-based policies.

Keywords. Inner areas, rural areas, quality of life, spatial effects.

JEL codes. O18, R00, R10, R11.

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 a 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;

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Petrosillo *et al.*, 2013). At EU level, QoL shows wide territorial imbalances, for instance among urban and rural areas (Eurofound 2014). Even the EU Rural Development Policy has traditionally stressed the importance of the quality of life in rural areas.

Nevertheless, when focusing on QoL territorial imbalances, the 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: as stressed by Christaller (1933), cities and larger towns have always provided population with essential services (e.g. education, health, mobility). 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 remote areas have started lagging behind. Suffering from geographical (and economic) remoteness and being affected by negative demographic trends, they have experienced a steady deprivation of essential services, which, in turn, has made the population decrease faster. These trends have led to 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 remote areas still suffer from these drawbacks (Bertolini *et al.,* 2008; Copus *et al.*, 2015), whose costs are paid by the country as a whole (Barca *et al.*, 2014). Thus, besides traditional North-South socio-economic divides, other kinds of spatially divergent dynamics still affect Italy, suggesting the existence of local core-periphery patterns.

To tackle this situation, the Italian government launched a specific National Strategy for Inner Areas, firstly aimed at defining them. According to it, inner areas are those municipalities that, being located at some considerable distance from major urban poles, suffer from a limited provision of essential services. Thus, such a definition essentially refers to a spatial (hence, more conventional) theoretical framework for inner areas, although a wide part of the European literature now points out 'aspatial' models of peripherality (Copus, 2001; Kuhn, 2015; Bock, 2016; Noguera and Copus, 2016). Conversely, inner areas as defined by the national strategy (namely, on a spatial basis) tend to share rural and agricultural traits (Barca *et al.*, 2014).

Since its launch, this strategy has fuelled the attention of Italian policymakers towards the need for improving social and economic conditions of people living in inner areas, as the only way to reverse negative demographic trends. Assuring a good performance of the local labour market, creating new forms of employment, and enhancing QoL levels represent the only way to cut emigration from inner areas and to attract new people and households (Barca *et al.*, 2014).

Given these important policy implications, this paper provides some simple statistical tools for policy analysis, and in particular for assessing and measuring existing gaps in QoL levels across Italy, with a specific attention to rural and inner areas. As QoL is a multidimensional concept, its measurement poses three major methodological issues (OECD, 2008), which this paper explicitly tackles: i) defining the most appropriate territorial level of analysis, according to available data; ii) returning a composite and comprehensive QoL indicator, whose variability across Italy can be eventually assessed; iii) properly stressing the role of spatial spillovers in influencing such a variability.

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 a spatial definition of inner areas, suggesting some ways to assess the importance of inner areas at NUTS 3 level. Section 4 provides a synthetic indicator of QoL, discussing main methodological approaches and returning main results. Main relationships between inner areas and QoL are also described. Section 5 focuses on spatial issues, by introducing into the analysis the role of spatial neighbourhoods. 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 as a way to promote innovative projects within remote municipalities. In this framework, remoteness is assessed in terms of lack of essential services, considered as constituents of the EU 'citizenship' (Barca *et al.*, 2014). Focusing on the provision of services, the strategy defines inner areas on the basis of their geographical distance from those centres (i.e. large cities) providing services. Thus, rather than an 'aspatial' definition of inner peripheries, a spatial approach is mostly adopted.

Referring to service provision as a key element to classify the territory is not a completely new approach: it was introduced in 2008 by the EU DG Regio, 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). DG Regio combined the OECD population criterion with an indicator of distance and it considered the driving time (namely 45 minutes) to reach a city of at least 50.000 inhabitants, as a main centre of services.

In contrast to the DG Regio classification, the methodology suggested by the Italian national strategy does not consider rural conditions or number of inhabitants of cities: it only focuses on the effective availability of services at municipal level, defining inner areas in terms of their spatial remoteness.

In particular, inner areas deserve political attention – and a national strategy – for many reasons. Firstly, they hide wide potentials, holding an important environmental (e.g., water, forests, natural and human landscapes), cultural (historic settlements, small and rural museums, skills centres) and agricultural heritage (Barca *et al.*, 2014). Secondly, they still represent a key part of Italy (60% of the total land area and 25% of Italian population).

In order to improve their socio-economic conditions, the national strategy moves from inner areas' main problems. In fact, most of them have been facing a steady process of marginalisation, followed by a degradation in the provision of essential services (health, education and mobility). Therefore, they 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 (Barca *et al.*, 2014). As a way to reverse these trends, both enhancing QoL and improving labour market performances represent effective policy tools (Barca *et al.*, 2014).

In particular, the strategy moves from the idea that, despite common sense, some inner municipalities 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 to replicate them across Italy (Barca *et al.*, 2014). In most cases, interventions involve the promotion (and preservation) of local environment and local cultural resources.

To this respect, the definition of inner areas as suggested by the strategy could overlap with the identification of rural regions, which experience a significant lack in essential services provision as well. Nevertheless, both inner and rural areas may also share some potential strengths. For instance, they both have plenty of area-specific agricultural productions, which originate from tight connections between the territory and local skills. 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 highlighted 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, 2017).

Besides a radical change in its theoretical perspective, even the implementation of this strategy is innovative, as each region is forced to select a limited number of pilot programme areas[2], to promote territorial safeguarding, valorisation of natural and cultural assets (namely sustainable tourism), agricultural activities, renewable energy and energy saving, handicraft and local knowledge.

As underlined above, the enhancement of QoL at local level sits at the heart of the National Strategy for Inner Areas, their socio-economic development being the main aim of the strategy. In other words, QoL emerges as an important target of this strategy. Actually, the enhancement of QoL is crucial to promote local development, involving both economic growth and a greater social inclusion. As already mentioned, the ultimate objective – and guiding light – of the strategy is reversing population trends in inner and remote areas. 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. Therefore, 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, which now show polymorphic traits, having followed differentiated trajectories of development for decades (Barca *et al.*, 2014). Thus, assessing different needs across different areas as well as different geographic patterns may represent a great improvement to the strategy itself.

[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, which may also show positive effects on the environment (Barca *et al.*, 2014). Indeed, Common Agricultural Policy stresses cross-compliance as a key point (Matthews, 2013).

[2] Although following nationally shared criteria, regions are in charge of identifying the neediest areas, according to a well-defined selective approach (Barca *et al.*, 2014).

3. How "inner" are NUTS 3 regions? Methodological and measurement issues

3.1 Share of inner areas at NUTS 3 level

The national strategy provides a detailed and innovative methodology to classify Italian municipalities. 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 from more accurate indicators of existing territorial differences. Here, the identification of inner areas moves from the polycentric structure of Italy, where just some main cities provide services to other municipalities that gravitate around them, each of them with its own level of spatial remoteness. 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 in a spatial perspective);
- inner areas are not homogeneous and, in fact, they are becoming more diverse with regard to their own socio-economic and territorial development (Sotte *et al.*, 2012; Barca *et al.*, 2014; Copus *et al.* 2015). For decades, they have followed different evolutions, according to both their natural/geographical characteristics and their relative proximity/remoteness to urban areas. In other words, different time-space evolutionary patterns have occurred among inner areas.

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) the full range of secondary education; ii) at least one major emergency care hospital; ii) at least one medium railway station, with an average degree of uptake for regional services and some long-distance journeys[3]. Accordingly, both urban poles and inter-municipal poles are defined as those cities (or groups of contiguous cities) that provide the whole set of these services[4]. Then, all remaining municipalities are classified into four different typologies (outlying areas; intermediate areas; peripheral areas and ultra-peripheral areas), according to spatial accessibility. Number of minutes taken to get from each municipality to the nearest urban pole is considered to compute each band (less than 20 minutes, less than 40 minutes, less than 75 minutes, more than 75 minutes) (Barca *et al.*, 2014). As stressed, such a classification moves from a spatial definition of inner areas, considering no other socio-economic weaknesses but remoteness. 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 purposes of this work, here we refer to this broader definition of inner areas.

Nevertheless, some methodological drawbacks occur. A first issue deals with the territorial level of the analysis. Inner areas are defined at municipality level, but no reliable

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[3] Barca *et al.* (2014) provide further details on the characteristics of services under consideration.

[4] All NUTS 3-level capital municipalities are considered as urban poles, even when they do not provide all the aforementioned set of essential services (Barca *et al.*, 2014).

QoL indicators are available at such a territorially disaggregated level. At the maximum, any analysis can refer to NUTS 3 level (i.e., 110 observations). Thus, municipal data have to be converted into NUTS 3 level data[5]. To return robust results, the relevance of inner areas within each NUTS 3 region is computed according to three alternative indicators. Firstly, number of municipalities is considered. Given the *i*-th NUTS 3 region and its *n* municipalities, the inner-municipality indicator (I_i) is defined as follows:

$$I_i = \frac{\sum_{j=1}^{n} m_j}{n} \tag{1}$$

where j is one of the n municipalities in the NUTS 3 region 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 NUTS 3 region and its n municipalities, the inner-population indicator (IP_i) and the inner-area indicator (IA_i) are defined as follows:

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

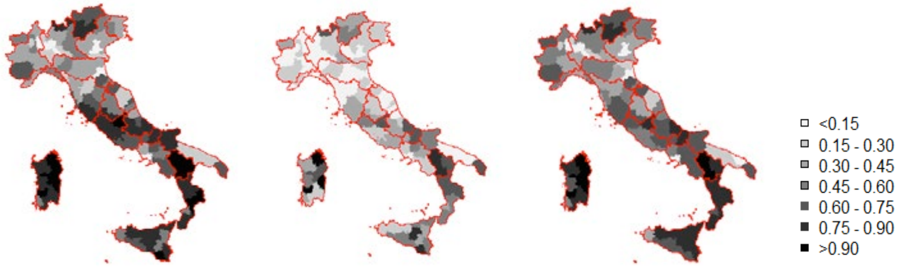
$$IA_i = \frac{\sum_{j=1}^{n} (m_j A_j)}{\sum_{j=1}^{n} A_j} \tag{3}$$

where j is one of the n municipalities in the NUTS 3 region i, P_j is its population and A_j is its land area. As in (1), the generic element m_j can take two values (either 0 or 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 of the three indicators at NUTS 3 level. While I_i and IA_i show similar patterns, when focusing on population, the share of inner areas at NUTS 3 level is generally lower. Just in a few Southern NUTS 3 regions, the share of population living in inner municipalities is above 50%. A sharp North-South divide also emerges when looking at average values at regional level (Table 1). Among Italian NUTS 2 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.

[5] The authors are aware that such a transformation may results into concrete limitations for the analysis. In some cases, NUTS 3 regions might be internally heterogeneous. Thus, a focus on LAU 2 territorial units would be much more appropriate for this kind of analysis, if data about QoL were available.

Figure 1. Inner areas, share out of the total by NUTS 3 region: Number of inner municipalities (left); Inner population (centre); Inner land area (right).



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, inner areas are expected to 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 (PeripheRurality Indicator) (Camaioni *et al.*, 2013); the FRI (Fuzzy Rurality Indicator) (Pagliacci, 2017).

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).

Camaioni *et al.* (2013) compute the PRI, 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 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), which ranges from 0 to 1, where 0 stands for completely urban; 1 stands for completely rural (Pagliacci, 2017).

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, also thanks to the spatial definition of inner areas adopted by the strategy. Coefficients are larger for the FRI than for the PRI, although the latter also assesses NUTS 3 regions remoteness (thus, a spatial concept, 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: 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.[7] Tests show statistically significant differences in any specification. As a strong relationship between rural and inner areas emerges, the National Strategy for Inner Areas implicitly refers to rural areas, as well.

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[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 NUTS 3 regions were just instituted in 2004.

[7] Preliminarily, Levene's Test is computed. 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 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, 2017)	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 as a multidimensional concept

4.1 The Mazziotta-Pareto Index

As a multidimensional concept (MEA, 2005), QoL includes both economic aspects and social-relational ones (Cagliero *et al.*, 2011; Costanza *et al.*, 2008; Petrosillo *et al.*, 2013). Thus, measuring QoL is harder than measuring the presence of inner areas: it requires the challenging construction of a composite and multidimensional index (OECD, 2008; Mazziotta and Pareto, 2014).

In the case of QoL, both 'objective' and 'subjective' aspects matter. The former dimension refers to physical and health status, personal income, local standards of living (Malkina-Pykh and Pykh, 2008; Petrosillo *et al.*, 2013). The latter focuses on individuals' subjective experience of their lives (Land, 1996) as well as psychological responses (e.g., life and job satisfaction and personal happiness). 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 no subjective measures of QoL are included, as assessing them is rather difficult. Actually, no sociologic surveys or investigations (Shin and Johnson, 1978) are available at NUTS 3 level. Therefore, this analysis just focuses on objective QoL indicators.

According to this perspective, a wide literature has already discussed 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). In Italy, the most cited QoL indicator, available at NUTS 3 level, is 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 large 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 may affect the 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 tackle these drawbacks, an alternative indicator is suggested here: the Mazziotta-Pareto Index (MPI), a well consolidated indicator to assess 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 $S_{x_j} = \sqrt{\frac{\sum_{i=1}^{n} (x_{ij} - M_{xj})^2}{n}}$

In particular, (4) is applied to those indicators that are concordant in sign with the QoL MPI; otherwise, (5) is applied. Accordingly, p sub-indicators of QoL are computed,

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

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

The $S_{\bar{z}_i} cv_{\bar{z}_i}$ product represents the most innovative aspect of this approach. It penalises those units showing unbalanced values of the p thematic sub-indicators (Mazziotta and Pareto, 2016). In addition, 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 Italian NUTS 3 region. 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 the ones provided by "Il Sole 24 Ore". Nevertheless, original variables are open data published by the OpenCoesione (OC) dataset: the fact that the source of data is ISTAT in most cases assures full comparability of results across time. [9] (Table 3).

4.2 QoL and its sub-indicators: main territorial patterns

Seven sub-indicators of QoL are returned. Each sub-indicator shows standardised values.

Figure 2 shows the values of each sub-indicator across Italian NUTS 3 regions. Wealth and economic competitiveness show a strong North-South divide, confirming larger QoL

[9] Replicability of the analysis over time is a key issue. Indeed, changing the set of variables under study may dramatically affect final outcomes.

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

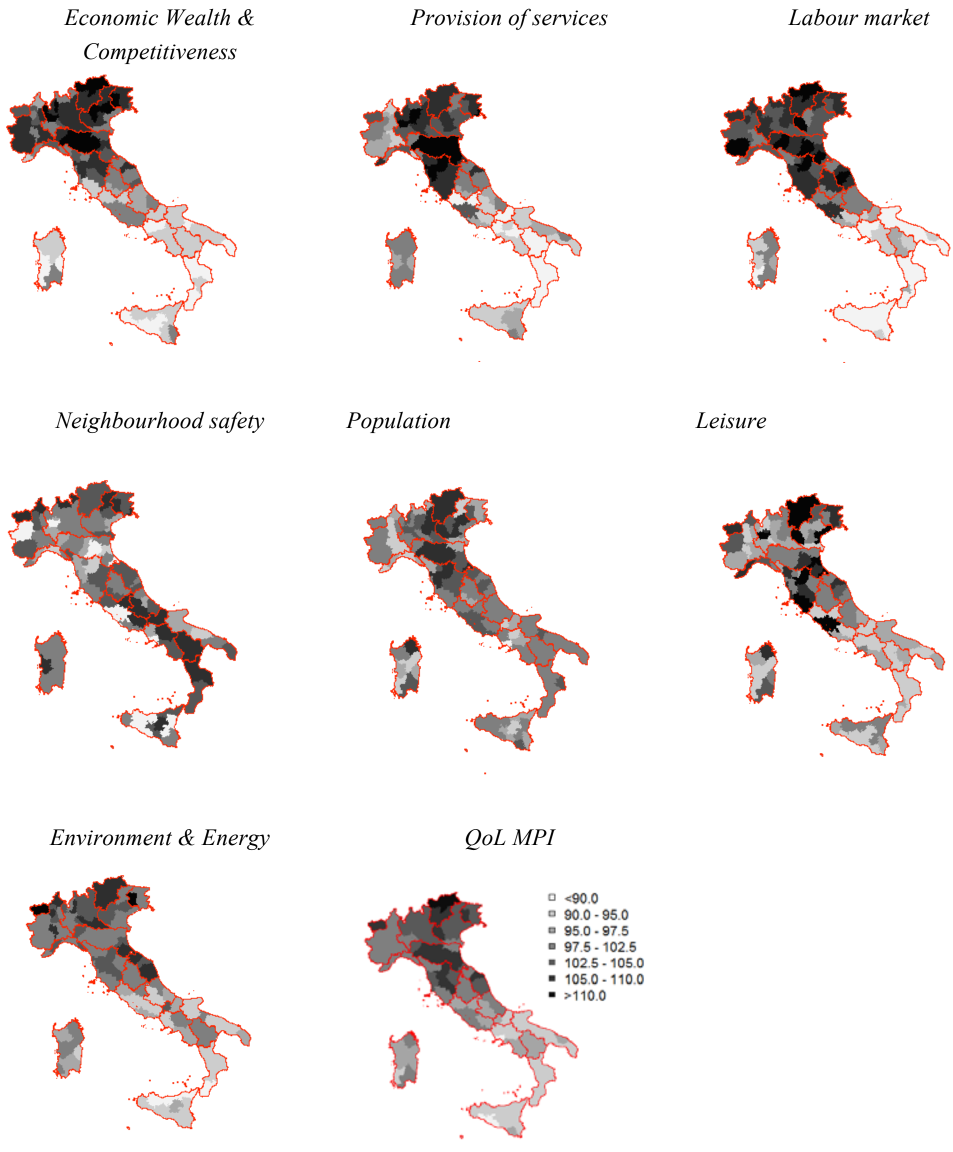
Variable	Definition	Effect on QoL	Year	Source
Economic wealth & Competitiveness				
Per capita GVA (€)	Gross Value Added (current prices) per inhabitants, all sectors	+	2013	Istat
Per capita Export (€)	Exports per inhabitants	+	2014	Istat (OC)
Per capita Patents	Patents registered to the European Patent 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	Istat (OC)
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	
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	Istat (OC)
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	
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	Istat on Ministero Interno, Dipartimento Pubblica Sicurezza data (OC)			
Rate of thefts	Number of recorded thefts per a thousand inhabitants	-	2013	
Rate of robberies	Number of recorded robberies per a thousand inhabitants	-	2013	
Rate of homicides	Number of recorded intentional homicides per 100 thousand inhabitants	-	2013	
Population				
Population Density	Inhabitants per km^2	-	2014	Istat
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	

Variable	Definition	Effect on QoL	Year	Source
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 data (OC)
Renewable energy	% of GWh renewable energy to total energy production in GWh	+	2010	
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.

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. Provision of services is at a maximum across Emilia-Romagna and Tuscany, due to a long-lasting attention to these political items (Bripi *et al.*, 2011; Giordano and Tommasino, 2011). Conversely, education and health services show poor performances across the South (e.g., Molise, Basilicata and Calabria) and in Lazio. Similarly, labour market performance is poor in Southern NUTS 3 regions, whereas the best performances occur across the so-called Third Italy (Bagnasco, 1977 and 1988), namely in the North-East and alongside the Adriatic. Neighbourhood safety shows a less sharp North-South divide. Best performances

Figure 2. Sub-indicators of QoL and QoL MPI, by NUTS 3 region.



Source: authors' elaboration.

are observed across mountain areas (the Alps and the Apennines), while metropolitan and urban NUTS 3 regions show poorer performances. Population sub-indicator shows a good performance across Emilia-Romagna and Trentino-Alto Adige. Nevertheless, Southern regions do not lag behind Northern ones, despite a lower presence of foreign people. Leisure activities show a scattered pattern across Italy, with urban areas and many Northern and Central Italian regions performing above the average. Lastly, when considering 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.

Moving from these sub-indicators, a comprehensive QoL MPI is computed, by penalising those NUTS 3 regions that show more unbalanced performances.

Figure 2 also returns main results for QoL MPI: most of Northern NUTS 3 regions share above-the-average levels of QoL MPI, while Southern ones generally lag behind.

Rather than returning a ranking of NUTS 3 regions (which may change over time), the following sections aim to analyse existing correlations between inner areas and QoL levels. Furthermore, it is possible to notice that results would not have changed much, if we had not considered the penalty coefficient $S_{\bar{z}_i} cv_{\bar{z}_i}$ Indeed, QoL MPI and the average mean of the seven indicators for each sub-thematic area are actually highly correlated. Nevertheless, the adopted procedure, although being more complex, seems to be more robust from a theoretical perspective.

4.3 QoL and inner areas: main relationships

The analysis of Pearson correlation coefficients makes possible the preliminary assessment of the main relationship between QoL levels and the presence of inner areas at NUTS 3 level (Table 4).

At national level, QoL dimensions are negatively correlated to the presence of inner areas, with the only exception of neighbourhood safety, which shows a positive relation with the presence of inner areas. A first – hence, preliminary – overlook of these results would suggest that 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. Nevertheless, same data may hide some more complex patterns, which could contrast this general and first overlook. Firstly, different patterns may arise at sub-national level.

On average, Italian Southern regions tend to show a larger presence of inner areas than Northern ones (section 3). This could affect overall results in terms of QoL MPI, as well. Thus, it is useful to disentangle previous results by macro-groups of regions. For sake of simplicity, here we refer to the classification provided in Table 1: Table 5 shows Pearson correlation coefficients per sub-indicator and per group of regions.

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

- 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 'envi-

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.

ronment 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: relationships between QoL and presence of inner areas are never significant.

Here, data 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 space

Regional patterns are just part of the story: actually, spatial effects can be modelled in a more accurate way. Italian NUTS 3 regions show a narrow extension: on average, their surface is 2,745 km^2, i.e. a square whose side is just 52 kilometre. Thus, people are used to live, work and spend part of their own leisure time across neighbouring NUTS 3 regions, and it could be misleading to consider QoL at NUTS 3 level by just focusing on the relationships between it and socio-economic features in the same NUTS 3 region. In fact, space matters (Tobler, 1970), at least in two ways. Firstly, QoL may show spatially clustered patterns, given the fact that neighbouring NUTS 3 regions tend to share similar QoL levels. Secondly, structural characteristics of neighbouring NUTS 3 regions (e.g., the presence of either urban poles or inner areas among them) may also affect QoL levels, having an impact on people's everyday life[10]. To this respect, these characteristics matter and should be considered separately.

5.1 Spatial autocorrelation: QoL across neighbouring NUTS 3 regions

The simplest way to assess 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), patterns of spatial association are formally assessed by means of the degree of dependency among observations within a given geographic space (Anselin, 1988 and 1995). Global Moran's I statistics tests for the presence of spatial dependence. It is a synthetic measure of global spatial autocorrelation, computed as follows (Moran, 1950; Cliff and Ord, 1981):

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

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].

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[10] Pagliacci (2014) suggested this idea in a preliminary analysis on QoL patterns across urban and rural Italian NUTS 3 regions. Nonetheless, that work simply considered the rough indicator returned by "Il Sole 24 Ore".

[11] Most of Italian NUTS3 regions show either 4 or 5 neighbours. Nevertheless, the least connected NUTS 3 region has just 1 neighbour, whereas the most connected one has 9 neighbours.

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. Global approaches do not allow the detection of specific regional structures of spatial autocorrelation (i.e., either spatial cluster or spatial outliers): to do that, local approaches are also considered. A Local Indicator of Spatial Association – LISA (Anselin 1995; Anselin *et al.*, 1996) 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 significant 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.

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 (i)	Cold spots (ii)	Spatial outliers (iii & iv)	No local autocorrelation (v)
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
Neighbourhood 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.

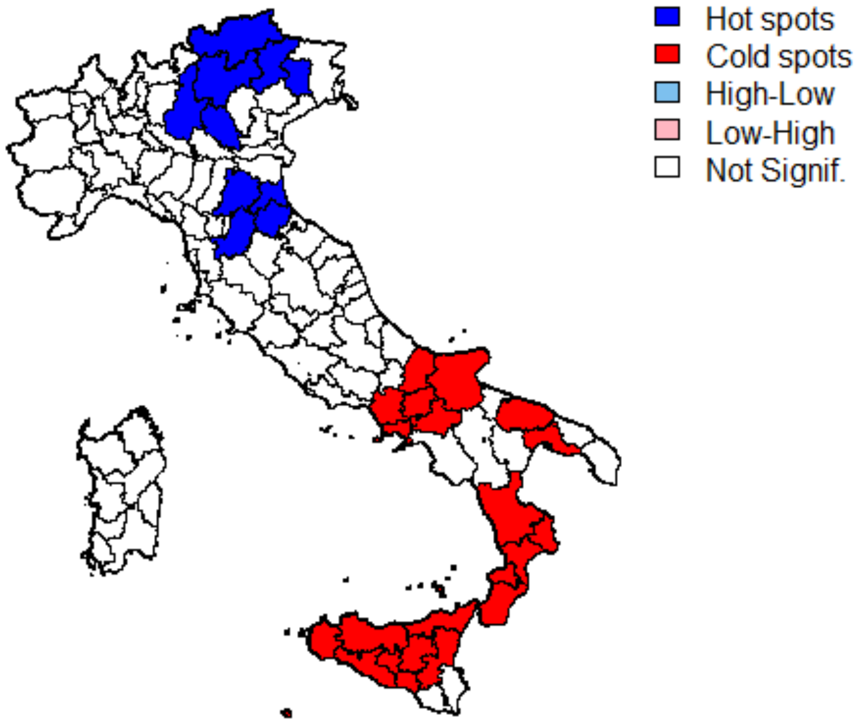
The analysis on the LISA values returns straightforward results (Table 6). In no cases, spatial outliers occur (confirming the sharp tendency to a positive spatial autocorrelation of observed values). In particular, neighbourhood safety and leisure are characterised by a fewer numbers of both hot and 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 classified 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 NUTS 3 regions.

For the sake of simplicity, Figure 3 maps the spatial clusters occurring when considering the comprehensive QoL MPI. Hot spots are mostly located across North-Eastern and Central Italy. 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.

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

In analysing spatial effects among neighbouring NUTS 3 regions, also the presence of either neighbouring inner areas or neighbouring larger urban poles may play an addi-

Figure 3. Hot and cold spots – QoL MPI.



Source: authors' elaboration.

tional 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):

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

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

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

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, while 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. Also, 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.

Moreover, with the only exception of NUTS 3 regions in the Centre, 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, suggesting the existence of positive spatial spillovers.

6. Conclusions

Through the improvement of both social and economic conditions of people living in inner areas, the Italian 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) for both inner and rural areas. Indeed, the paper has singled out that in Italy they largely overlap. Nevertheless, 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 both the QoL Mazziotta-Pareto Index, a

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

		Wealth & Competi-tiveness	Services	Labour Market	Neigh-bourhood Safety	Population	Leisure	Environ-ment & 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

composite and comprehensive indicator of QoL, computed at NUTS 3 level, and different sub-indicators of QoL (e.g. neighbourhood safety, labour market, leisure). Results suggest that, when controlling for sub-national structural divides, the 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.

Accordingly, it is hard to find conclusive results about the relationship between inner areas and QoL because of at least two major issues: the way inner areas are measured and the existence of spatial aspects, which make the picture even more complex.

Referring to the former issue, the computation of three indicators that aim to assess the importance of inner areas according to three different perspectives (i.e. number of municipalities, total population, and land area) represents an important advancement in this field of study. Indeed, each of them might be suitable for analysing specific dimensions of QoL, For instance, IA_i seems to be particularly suitable for considering "environment and energy" aspects, whereas IP_i can be linked to the provision of services to population. Accordingly, also policy implications are expected to differ, as opposite political domains might be interested in assessing the importance of inner areas at NUTS 3 level in different ways.

The latter issue refers to spatial aspects. People may spend significant parts of their lives out of their own NUTS 3 region. Therefore, even the neighbouring space is expected to matter in QoL. Here, main results support this idea. Both QoL sub-indicators and QoL MPI show a positive spatial autocorrelation and 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, as both positive and negative spatial spillovers can affect place-based policies and their effectiveness. 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 NUTS 3 region with a higher share of inner areas could have positive effects on QoL, especially in the North-East and in the South.

Thus, inner areas' diversity clearly emerges. Indeed, some of them show more socio-economic potential, even with respect to QoL drivers. Such a finding has important policy implications, even with respect to the National Strategy for Inner Areas. The top-down approach, carried out by the Italian central government, is crucial when setting policy targets. Nevertheless, it is even more important to maintain the decision-making process partially decentralised, in order to identify the most appropriate policy tools to target 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 imbalances 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.

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