LMAs as Urban Areas: an Alternative to Italy's *Città Metropolitane*?

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1. Introduction

In 1990, a law on local authorities introduced in the Italian administrative system the Metropolitan areas (*città metropolitane*),[3] but for two decades no implementation followed. The reason, arguably, was a standstill between the mayors of the capital municipalities and the provincial administrations. The former relied on the traditional strength of the Communes, dating from the Renaissance, and the recent introduction of their direct election. The latter had been in search of a role for a long time, since the introduction of regional governments in 1970.

In 2014 the situation changed abruptly. Another law reformed the Provinces, mostly voiding their administrative function and abolishing the direct election of representatives.[4] The same law enumerated the Metropolitan areas: Torino, Milano, Venezia, Genova, Bologna, Firenze, Bari, Napoli e Reggio Calabria, plus Roma Capitale, plus those defined by Sicily – Palermo, Messina and Catania – and Sardinia – Cagliari). Quite unexpectedly their territorial footprint was made to coincide with that of the relative provinces.

This solution has the merit of unlocking a stalemate. But the choice of provincial territories is baffling: provinces have undoubtedly a longstanding tradition, but they are fossils, in that they are the result of geographical, historical and legal vicissitudes, and mostly coincide with pre-unitarian dukedoms and states. More recently, the number of provinces increased (from

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[3] Law 8th June 1990, no. 142 "Ordinamento delle autonomie locali".

[4] Law 7th April 2014, no. 56 "Disposizioni sulle città metropolitane, sulle province, sulle unioni e fusioni di comuni".

92 in 1968 to 110), mostly as a result of local pressures, keener on the economic advantages of being the seat of an administrative body than on heritage issues. Whatever the reasons for their existence, these bodies and their territories are universally reputed unfit to answer the needs and challenges of modern metropolises.

In our opinion, an adequate answer to that needs and challenges would have been the adoption of a functional geography, namely that of Labour Market Areas (LMAs) based on commuting flows.

Istat has produced data on LMAs since the 1981 census and has recently changed the method for producing them. This change allowed for a three-way comparison (Barbieri & Barbieri, 2015) of the LMAs calculated in 2001 and 2011 with the old and new method. The comparison helped to establish that Italian LMAs are real-life urban configurations, not just the product of a theoretical method.

Already in 2015, Istat's *Annual Report* (Istat, 2015) argued that the 'new' geography of Metropolitan areas left aside any functional analysis aimed at finding the fittest configuration to satisfy local needs. These statements led to a comparison of provincial footprints and relevant LMAs. As expected, the two geographies are unrelated. On one side, the reduced province of Milan (whence two new provinces were excised in 1995 and 2009) is much smaller than the relative LMA, the largest in Italy. On the other, the expanse province of Turin (316 municipalities, including Alpine resorts) is much bigger than its LMA counterpart (112 municipalities). Moreover, resorting to the administrative footprint is not able to cope with polycentrism or the existence of other cities and towns in the province: it is the case of the industrial city of Ivrea, close to Turin.

More recently, Istat's *Annual Report* (Istat, 2017), in a study based on Census tracts and the methodology proposed by Vickers & Rees (2005), show that residential and functional features override systematically administrative boundaries. This appears to be a common character, regardless of the particularity of each conurbation, and confirms the 2015 results.

What can be done from a scientific standpoint? And what suggestions can analysis offer to the legislator and the policy maker?

The question is not peregrine because the law – after stating the general principle that the metropolitan area coincides with the footprint of the relative province – allows for single municipalities to choose whether or not to adhere to a metropolitan area, thus modifying its boundaries. For instance, Sardinia (an Autonomous Region) set up the Metropolitan area of Cagliari by aggregating the core municipality (Cagliari itself) with 17 municipalities (the immediate ring and other parts of the hinterland) in an *ex novo* conurbation. Cagliari is the one case where the creation of a *città metropolitana* follows a functional logic, instead of adopting the simple re-naming of the existing provincial territory.

Based on similar reasons – the inadequacy of the designated area – Turin followed a different, less radical, approach. Turin happens to be the largest metropolitan city in Italy, encompassing 316 municipalities, with an area of 6,827 km² comprising hills, mountains, plains and other urban areas. The solution, in this case, was that of maintaining the same territorial extension for the 'old' Province and the 'new' Metropolitan area, but of subdividing it into 11 homogeneous zones. Unfortunately, homogeneity is only in part the

same as functional zoning. At least four of the homogeneous zones refer to town and cities different from Turin (Chieri, Pinerolo, Chivasso and Ivrea), hinting to polycentrism. Three others follow a morphological criterion, based on a mountain and river valley logic. What is worse, the others have no name or identity (being called just AMT – Turin Metro Area – 1, 2 and 3), being unable to conceive whether their future will be linked or separated from that of the metropolis. In fact, the partition followed the lines of traditional political affinities and core-periphery disputes. On the contrary, there is no evidence that LMAs or commuting flows ever entered as issues in the decision-making process.

So, to get back to the main question, is the game over?

The authors think that not all is lost. There is still a space both for analytical research and for proposing tools to the policy makers on substituting, or at least complementing the present definition of the territory of Metropolitan areas with others taking into account functions and flows.

In this approach, the emphasis shifts from the main problem – that of the identification of the main boundaries of the Metropolitan areas, those dividing each of them from the rest of the country – to a couple of subordinate problems:

a) The problem of fine tuning, that is the problem of modifying the *città metropolitane* at their margins, through the choice made by single municipalities of adhering to a metropolitan area or not, and
b) The problem of specialisation, that is the problem of partitioning a single Metropolitan area in functional parts devoted to different urban roles, in a logic of complementarity or even of polycentrism.

Both problems can be dealt with a panoply of different methodologies, that the authors intend to test and compare.

1. ***Features of the urban fabric***. The continuity of the urban fabric can be assessed in two ways: by observing the morphological characteristics of the built environment, and by looking at the functional landscapes. The first approach identifies built areas, i. e. covered by buildings and settlements without important discontinuities, except those devoted to mobility (roads), social interaction (squares and similar spaces) and recreation (parks). The second approach classifies census tracts according to key characteristics that are common to the population living in that grouping. The pioneering work is the area classification of UK Census output areas, "on the basis of the similarity of […] geodemographics, [that] is 'the analysis of people by where they live' (Sleight, 2004, p. 18). Geodemographics works on the principle that place and population are inextricably linked, [because] similar people and households cluster spatially. Information on age, ethnicity, education, employment and type of housing, etc. is used to paint a picture of the type of people who live in an area. If similar people live in similar places then knowing information about one person enables information about others in that locality to be broadly inferred (Sleight, 2004; Weiss, 2000). Area classifications provide a unique way of bringing together spatial patterns from a range of variables and identifying similarities and dissimilarities between areas" (Vickers & Rees, 2006). In this approach, the metropolitan area is interpreted, unlike in the previous one, as a social and economic

entity. The two approaches, therefore, are defined by the contrast between static and relational aspects; that is, between the architectural and the urbanistic point of view. Or, if you like, between the *urbs* and the *civitas*.

2. ***Public transportation***, and especially personal rapid transit systems. One can compare them to the nervous system of a Metropolitan area, in the sense that they connect different parts of the city and, in doing that, they take into account (although implicitly) the motives for moving and thus the diverse functions of different parts and neighbourhoods. The modes, the frequency, the capacity, the actual volumes by the day of the week and by the time of the day represent other precious information on the hierarchy and organisation of urban functions. The *ex-ante* information on public transportation (i.e. type of carrier and mode, timetables, and so on) is widely available, even if not always comparable, as is often the case with administrative data. Moreover, data on the actual, *ex-post*, behaviour of citizens and users is getting easier and easier to get. Mass transit companies have quasi-realtime information based on ticket and pass validations. Also, user generated transportation data based on GPS from mobile applications on cell phones and activity tracking devices – even if possibly subject to a self-selection bias – is precious. Even other mobility data (cycling to work, for instance) show a high correlation with mass transit voyages.
3. ***Daily mobility flows***. The issue is quite similar to that of daily inter-municipal commuting as the basis for defining LMAs. Here the problem is that of a further functional partitioning of an area (typically the LMA of a *città metropolitana*). The availability of a commuting matrix by census tract based on the population census of 2011 makes it possible (with a few limitations) to analyse (a) whether the borders of a Metropolitan area need to be "corrected" by adding or subtracting single municipalities, and (b) whether the deserves to be furtherly functionally subdivided on the basis of the internal specialisation of its components. The authors intend to conduct this analysis using the new approach to the regionalisation problem proposed in Bianchi et al. (2016). In this approach, the problem is converted into a graph partitioning problem, and the solution is obtained by solving a sequence of minimum cut problems over an undirected graph obtained from the interactions among the localities.

During the workshop, we present the preliminary results achieved on the first research track.

2. Features of the urban fabric

To represent metropolitan realities beyond the administrative boundaries and to identify the socio-spatial relationships that define them, we started characterising their composition in terms of social groups, as briefly anticipated above.

The aim is to produce a detailed representation, at a small spatial scale, of the settlements dynamics of different social groups through the use of Census data (2011) related to the Census tract, a small non-administrative territorial unit that has the advantage of allowing a functional spatial reconfiguration of the phenomenon under exam. In this case, the exercise carried out has produced five types of areas defined by the predominant character of the resident individuals. The methodology used to propose an 'ecological' classification of the different urban areas – i.e., to group them by similar characteristics appropriately identified –

refers to geodemography, that is, the analysis of people based on their place of residence. As we said above, geodemography rests on the observation that populations and places of residence are inextricably linked: knowing where a person resides provides information on its characteristics since people and families with similar features tend to aggregate in space. From the opposite perspective, information on age, occupational status, educational achievement, family type, citizenship and so on are useful in defining the functional typology of the portion of the city concerned. The latter also emerges in the empirical evidence – as well as in the literature on the subject (wide, varied and often characterised by opposing visions) – the close link between the profiles of social groups and their geographical distribution.

The pattern of residences and establishments in space is the result of three factors:

(i) A functional organisation expressed in the present and everyday life.
(ii) The evidence of the hierarchies implicit in social stratification (the city of the rich and the city of the poor).
(iii) The result of the accumulation of knowledge, which is what ultimately makes the city so attractive to people and economic activities.

The latter is what defines, in particular, the urban areas. There, historically, the settlements of 'strong' and 'weak' groups oppose each other. There, phenomena such as segregation, the creation of ethnic enclaves, the predominance of elite spaces give rise to social geographies that often overlap the administrative ones, offering a cognitive instrument of primary importance to scholars, policy-makers and local communities.

* * *

Based on these theoretical references, we have defined five spatial and social groupings. Starting from a set of socio-demographic characteristics of the population residing in a certain area, we used a multivariate clustering technique applied to the Census data of 2011, with the aim of producing a detailed spatial representation of residential and settlement configurations.

We analysed the 14 LMAs roughly corresponding to the metropolitan areas defined by the law (see above), representing the main urban realities in Italy. Within the LMAs, we study separately the core (the metropolitan municipality) and the ring (the functional area surrounding it).

The spatial dimension of social inequalities thus outlined is interesting not only at the national and regional levels but especially at the urban level. Cities are a stimulating field of observation not only because the bulk of the national population lives there, but also because the main issues and contradictions of the contemporary world coexist there: migration processes, inequalities, environmental problems, economic issues, social innovation, creativity.

This diversity, the concentration and proximity of different subjects and realities, constitute the strength and fragility of cities. How social groups defined by nationality, sex, age, occupational educational and housing status interact in cities and metropolitan areas assume specific features and dimensions, sometimes allowing common perspectives. Space becomes

an instrument to a better understanding of the complexity and allows to move from a mere representation of spaces to a more in-depth connotation and characterization of places.

On the basis of this theoretical approach, we have defined five socio-territorial clusters, based on the socio-demographic characteristics of the population residing in Census tracts. Following the Vickers & Rees (2007) approach, a cluster analysis was carried out using data collected from the population and housing Census of 2011. In particular, the 14 LMAs whose capital is also the capital of a metropolitan city:

- Turin, Milan, Venice, Genoa and Bologna in Northern Italy
- Florence and Rome in the Centre;
- Naples, Bari and Reggio di Calabria in the South;
- Palermo, Messina, Catania and Cagliari in the Islands.

The clustering method applies the K-means algorithm. This method is considered computationally more appropriate than hierarchical methods when the number of units of analysis is particularly high (Everitt et al., 2001; Vickers et al., 2005) and is widely used in the geodemographic analysis (Harris et al., 2005). The measure of dissimilarity adopted is the squared Euclidean distance. The K-means classification algorithm requires the definition of a number of a priori clusters. As mentioned in Vickers and Rees (2007) and Callingham (2003), the initial number of clusters should be around 6. Taking this as a starting point, we performed several tests by varying the number of clusters between 4 and 8. The best result identifies 5 clusters. The choice also took into account the size of clusters and group variance.

As a whole, these systems contain 661 municipalities, totalling 85,310 sections. Over 17.5 million inhabitants (29 percent of the national population in 2011), half of which in the 14 core municipalities, live there.

We removed from the analysis zero population tracts (4,114 empty tracts) and very low population density tracts (2,194 additional ones).

The indicators considered make it possible to differentiate the areas according to population structure by age, sex and citizenship (Italian vs. foreign), and by socio-economic features such as the education attainment, the dimension of the household, the employment and profession and so on. To these indicators, we added the population density, as a proxy of the degree of urbanisation.

Below is the detail of the indicators used in the classification analysis:

1) Population density (population/land area)
2) Share of foreigners (foreigners/ population)
3) Age ratio (population aged 65 and above / population aged 0-14)
4) Age dependency ratio (ratio of dependents – people younger than 15 and older than 65 — to the working-age population – those aged)
5) Childhood ratio (population aged 5-9 /total population)
6) Sex ratio (females/males)
7) Illiteracy rate (illiterate population /population aged six and above)
8) Share of population with at most primary education (population with at most the primary school title/population aged six and above)

9) Share of population with lower secondary education (population with at most the lower secondary school title/population aged six and above)
10) Share of population with upper secondary education (population with at most the upper secondary school title/population aged six and above)
11) Share of population with tertiary education (population with a bachelor degree or equivalent/population aged six and above)
12) Employment rate (employed population aged 15 and above/population aged 15 and above)
13) Unemployment rate (unemployed population aged 15 and above/labour force aged 15 and above)
14) Tenancy rate (tenancy/total housing tenure)
15) Owner-occupancy rate (owner-occupancy/total housing tenure)
16) Other tenure rate (other housing tenure/total housing tenure)
17) Share of one-person households (one-person households/total households)
18) Share of medium-size households (2-3 person households/total households)
19) Share of large-size households (4-5 person households/total households)
20) Share of extended-size households (6+ person households/total households)
21) Share of blue-collar workers (skilled agricultural, forestry and fishery workers, craft and related trades workers, plant and machine operators and assemblers, elementary occupations /population aged 15 and above)
22) Share of off-white collar workers (clerical support workers, services and sales workers/population aged 15 and above)
23) Share of white collar workers (managers, professionals, technicians and associate professionals, armed forces/population aged 15 and above)
24) Share of family helpers (family helpers/population aged 15 and above)
25) Share of retired persons (retired persons/ population aged 15 and above)
26) Share of managers (managers /population aged 15 and above)

To avoid problems due to the redundancy of the indicators, we measured their correlation lev.Since it was rather low, we decided to keep for analysis the complete set of indicators. Also, following the Vickers & Rees (2007) approach, each indicator has been standardised by applying the following formula:

$$I_i^{ST} = (I_i - I_{min})/(I_{max} - I_{min})$$

Where:

I is the indicator, and i is the i-th census section.

As a result of the standardisation, each indicator (I^{ST}) assumes a value between 0 and 1.

The exercise carried out has produced five types of defined areas based on all the characteristics of the residents:

- Upper-middle class areas
- Middle-class areas
- Ageing population areas
- Young household areas
- Working class areas / declining areas

* * *

When reading the descriptions and the analyses presented, it is good to keep in mind two cautionary elements. The first is that each area is qualified according to the predominant, but not exclusive, profile of the population living in the area itself. So, one should read the results in terms of territorial specialisation of the different portions of the city. The second is that the classification exercise is carried out over the whole of the local systems of the 14 metropolitan cities. As a consequence, in addition to the characteristics of the single city, the analysis highlights the features common to all the cities belonging to the same region. For this reason, southern cities are so different from those of the Centre-North, and sometimes the differences *between* metropolitan cities look more relevant than those within them.

Upper-middle class areas, i. e. residential areas with medium to high profile. These areas, where 16.5 percent of the total population of the local systems of the 14 metropolitan cities (nearly 2.9 million people) resides, have a rather high residential density, a noteworthy presence of older adults, an employment rate higher than in the other areas, and the lowest unemployment rate. Residents are highly trained and qualified, with a relative presence of graduates particularly high; when employed, their occupation is highly specialised (freelancers, entrepreneurs, etc.). Their households are small and characterised by owner-occupancy dwellings. This kind of area is particularly widespread in the cities of the Centre-North, where they represent the most frequent typology.

Middle-class areas, i. e. residential areas with a medium profile. In these areas lives the 40.9 percent of the population (over 7.1 million people). These districts lack salient features regarding age, gender, educational attainment (lower or upper secondary education is frequent) and household size (2-3 components). Residents in these areas mostly live in owner-occupancy houses. The employment rate is just above the average. People are occupied as skilled workers, clerks, services and sales workers more often than in the average.

Ageing population areas. In these areas the density is high. Residents (over 3.0 million people, 17.3 percent of the total population of metropolitan cities) are often old and retired, but there is also a foreign presence of some importance. Households are small, often one-person ones, and occupy their houses as tenants. The educational attainment is in line with the average. Alongside the elderly, in these areas there is also a quota of younger employees with similar socio-demographic characteristics (low or middle educational attainment and low-skilled occupation).

Young household areas, i. e. popular areas with young tenants. These are densely populated areas (nearly 3.4 million people live, accounting for 19.3 percent of the total). The resident population is mostly Italian, relatively young, with a low educational attainment, living in traditional families (4 or more members), dwelling in tenancy or other tenure houses. The unemployment rate is high, the highest recorded in the five typologies identified. If employed, the inhabitants of these areas mostly have low-skilled occupations. This kind of areas is widespread in the cities in the Mezzogiorno, and particularly in Naples and Palermo.

Working class areas and declining areas, i. e. popular areas at risk of degradation. These are areas with very high residential density, where little more than one million people reside,

accounting for 5.9 percent of the total. They differ from the popular areas with young tenants described above especially for a higher average age and the presence of foreigners. Other characteristics, however, are similar to the previous group: large families living as tenants, high unemployment, low employment, low educational attainment, low skill occupations (blue collars in agriculture and manufacturing, clerical support workers, family helpers).

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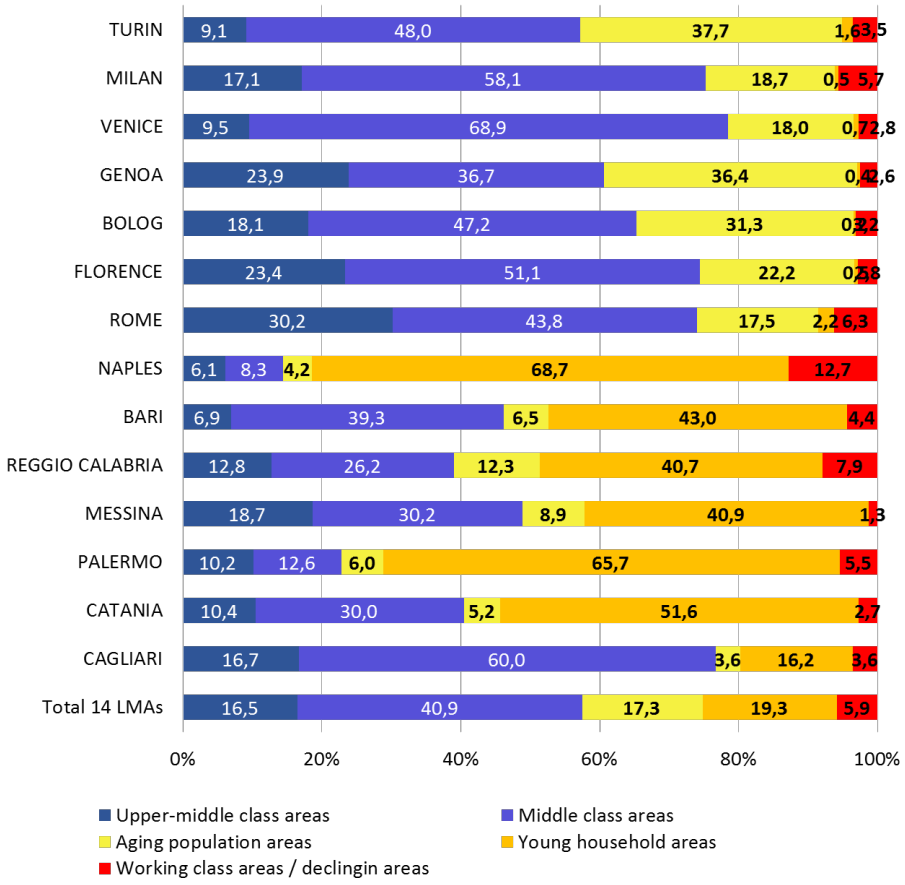
Figure 1 shows in detail for each of the 14 metropolitan local systems the population share that falls within the identified areas. There is a clear difference between the Centre-North and the southern local systems. In the first, about half of the population dwells in territorial units characterised by an average profile (middle-class areas). The share varies between the maximum of 68.9 percent in Venice, to 58.1 percent in Milan, 51.1 percent in Florence, 48.0 percent in Turin, 47.2 percent in Bologna, ending with Rome and Genoa with 43.8 and 36.7 percent, respectively. Moreover, between 10 and 30 percent of the population live in districts with a higher residential quality (upper-middle class areas), ranging from a minimum of 9.1 percent in Turin to a maximum of 30.2 percent in Genoa.

Figure 1 - Distribution of areas within individual local labour systems (percentages of total population)



Source: Istat, Population and housing census, 2011

This picture is consistent with what happened in these territories during the economic boom of the Fifties and Sixties. The greatest employment opportunities and the great expansion of the built residential environment have fostered the growth and consolidation of these great conurbations. They were the 'natural' destination of very large internal migrations, coming mainly from Southern Italy. With time and generational passages intervening, what once was the social class of immigrants (predominantly factory workers) has become the 'new' middle class.

The second major social connotation of the central-northern territories is the areas inhabited predominantly by the elderly population. In Turin, Genoa, Bologna these sections concentrate more than 30 percent of the population (37.7 percent in Turin). Even in Florence, Milan, Venice and Rome it reaches or exceeds 20 percent. Ageing, which is now relevant to the entire Italian population, appears to be a particularly obvious urban qualification in this analysis.

For each of the central-northern local systems, the relative weight of the census tracts classified in the other typologies is smaller. However, where immigration has been more intense or longest-standing, the areas at risk of degradation are more populous: it is the case of Rome (6.3 percent) and Milan (5.7 percent).

However, one should read these data with due caution: they do not take into account the very important distinction between the core (the central municipality) and the ring (i. e. the periphery, all other municipalities) of local systems. This is nevertheless a fundamental distinction to highlight territories characterised by relatively small, but well-defined social groups concentrated in specific localities.

When we move to the Mezzogiorno, there the local systems show a widespread presence of weak and frail situations. This is especially true for the indigenous component (young household areas, i. e. popular areas with young tenants), even if with some exceptions. Nevertheless, one should note the great heterogeneity, both internal (within an individual local system) and external (between different local systems).

The shift towards fragile profiles is certainly attributable to the weaker economic and territorial attractivity that characterises the South, but the well-known dualism between the Centre-North and the Mezzogiorno is feebler than expected and even contradicted – at least in part – by what emerges from the classification exercise here conducted.

Most of the population dwells in young household areas (popular areas with young tenants): 68.7 percent of the population of the local system in Naples and 65.7 percent of Palermo. Important quotas are also recorded in those of Catania (51.6 percent), Bari (43.0 per cent), Messina (40.9 per cent) and Reggio di Calabria (40.7 per cent). Conversely, in the capitals of the Kingdom of the two Sicilies, the middle- and upper-middle-class residential areas are relatively small: 8.3 and 6.1 per cent, respectively, in the case of Naples; 12, 6 and 10.2 percent in Palermo. Different is the case with the Bari local system, where the percentage of sections with upper-middle-class profiles is quite contained (6.9 percent), but where the proportion of middle-class areas is quite relevant (39.3 percent). This greater heterogeneity, which we also find in the remaining local systems in the Mezzogiorno, is due to several factors. For instance, the monocentric or polycentric feature of the regional territorial

structure has a clear impact on the role and functions of the relevant *città metropolitana*. This explains, for instance, why in the local system of Cagliari a significant proportion of the population dwells in areas with a middle-class or upper-middle-class profile (60 and 17 percent).On the other hand, the population dwelling in popular areas with young tenants (young household areas) represents the 16.2 percent of the total.

The fractions of the population living in census tracts characterised as popular areas at risk of degradation are, in many cases, significantly higher than those found in the central-northern local systems. This signal a more 'mixed' situation in these as compared to those in the Centre-North. This is again the case with Naples (12.7 percent), Reggio di Calabria (7.9 percent) and Palermo (5.5).

Fo sure, the so-called "spontaneous" urbanism – typical of the Mezzogiorno over a long time – has played an important role in these patterns. According to some theories, spontaneism would have favoured integration in the face of the rigid functional distinction and segregation of places and spaces, typical instead of an urbanism programmed from above with the criterion of zoning, as in the case of the banlieues of the French metropolis.

Finally, as compared to the local systems of the Centre-North, the census tracts classified as the ageing population areas are more sparse, though with some exception, revealing that Southern cities are altogether less 'old' than the average.

3. Final remarks

The five typologies of areas allow for an ecological analysis to understand where and how social inequalities are located in urban space.

The first element that emerges is complexity: concerning the characters analysed, we observe a progressive loss of boundaries between centre and periphery, which leads to a rethinking of the theories of interpretation based on these spatial categories. Instead, we observe a spatial process, moving from the evolutionary framework of the urban and peri-urban social structure, but where on pre-existing settlements insist new kinds of urban dwellers, in a dynamic interaction between functional parts of the city, designing new and varied geographies.

The second element common to most cases analysed is the absence of the uniformity of peripheries, achieved through a residential segregation of the most disadvantaged groups. It does not emerge, therefore, a model of settlements defined by large areas distinct from the exclusive presence of specific social groups. This 'porosity' between different areas and groups is an element of strength in the perspective of a greater social integration. At the same time, is a possible catalyst for conflict in contexts where occupational precariousness, degraded living conditions, difficult access to services and low 'livability' levels prevail.

The third element that exemplifies the different urban typologies is the presence of compact areas characterised by a strong prevalence of medium-high social profiles. However, these areas also show evolutionary processes of contamination by different social groups, such as

foreign-born immigrants occupied in trade and services, high-education young households, skilled artisans, artists and creators.

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