

ROBUSTNESS AND PERSISTENCE IN THE ITALIAN URBAN LANDSCAPE

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SOMMARIO

Local systems are conglomerations of municipalities held together by commuting links. They are – we claim – real life cities, even if not made of brick and mortar, but of relationships. We present convincing evidence based on a natural experiment of history. Statistics Italy (Istat) has been disseminating local systems based on commuting data collected on the occasion of population censuses since 1971. Recently, it changed the algorithm generating local systems.

In this way, we can identify persistent local systems, those found by the same (new) algorithm both in 2001 and 2011; robust local systems, those identified in 2001 no matter which algorithm was used; local systems which are both robust and persistent, and so on.

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1. Introduction

Local systems (SLs) are functional partitions based on commuting patterns (more details are given below). Statistics Italy has been producing SLs geographies every decade since 1981, in the occasion of census waves. One of the most evident phenomena emerging from the comparison between 1981 and 2011 SLs is their quantitative reduction, from almost one thousand to just above 600 during three decades. The difference in the regionalization algorithm suggests a methodological caution in the interpretation of the change, but its direction and its size are clear enough: the past method identified 955 SLs in 1981, the new one 611 in 2011.

What territorial, urban, and industrial dynamics brought the SLs' geography to concentrate and simplify itself through time, even though daily home-to-work commuting phenomena intensified? Through what dynamics some SLs attracted municipalities once pertaining to other gravitational areas? To what extent such processes – which can be generally interpreted as signals of a long-term dynamics towards territorial concentration – diverged in space with primary effects on the organisation and vitality of urban areas?

The transformations of SLs depend on many factors: changes in the demographic, social, and professional characteristics of the resident population; changes in the territorial redistribution of homes and workplaces; changes in the industrial specialisation; infrastructural and functional changes in the transport and communication systems; and so on. Conversely, the permanence in time of such spatial and relational configurations can be interpreted as a corroboration of the thesis that SLs are real objects, social constructs emerging from the self-organisation of activities and relationships on the territory, where the agents are people (and, subsequently, the social and economic subjects stemming from their self-organisation).

After a first section dedicated, as usual, to the relevant literature review, we describe the data sources and the methodology adopted in our study. The section on our results and their discussion is subdivided in three paragraphs: the first is dedicated to robustness and persistence of SLs, the second to the presentation of SLs as daily urban systems, the third to the consequences of interpreting SLs as cities. The conclusions sum up our present research and future prospects.

2. Literature Review

The very concept of SL (Istat 2014a) tends toward approximating a functional definition of urban space, constructed more by social relationships than by the built environment. Key elements to this are the hypotheses:

- that people's daily commutes represent exhaustively the set of their social and economic relationships;
- that the trips between residence and workplace are an acceptable proxy of other kinds of daily trips (those motivated by study, family business, and leisure; Isfort 2007);
- that the agents of such processes are firstly people, and secondly the social and economic actors in which people organise themselves;
- that the self-organisation of activities and relationships defines self-contained and integrated cells, that is to say units relatively impervious to external flows and strongly connected within.

Such assimilation of SLs to the urban form could look at first unorthodox. For this reason it deserves an in-depth analysis with reference to both terms, cities and SLs.

The concept of city has been discussed for many centuries, and the literature is endless. Anyway, the statement that cities are not made of buildings, but of people, no longer looks like a paradox and tends to be universally accepted. In his best-seller, *Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier*, Edward Glaeser (2011) reminds us that “that cities aren't structures; cities are people.” Glaeser himself, on the other hand, acknowledges that “many of the ideas in

[his] book draw on the wisdom of the great urbanist Jane Jacobs”: the authors of this paper would like to acknowledge the same debt, especially to Jacobs (1970). On the other hand, Romans had already made a distinction between *urbs* (buildings and infrastructure) and *civitas* (the community of citizens). Even Shakespeare, in the *Coriolanus*, asks the rhetorical question: “What is a city, but the people?”

The concept of SL is, instead, much more recent, with reference both to its British origin, and to its Italian application.

In the United Kingdom, the TTWAs (Travel-to-work-areas) have been introduced in the 1960s as statistical areas aiming at making better and easier comparisons between unemployment rates possible, leading to a better understanding of local job markets (Coombes & Bond 2007). Apart from this direct reference to labour markets, nevertheless, the two key concepts (Goodman 1970; Smart 1974) – self-containment (i.e., the share of trips with origin and destination in the area that crosses its border is limited) and integration (i.e., the number of daily commuting flows among municipalities within the area is high relative to the population and the labour force) – are basic elements of a functional interpretation of the urban system.

As to the Italian experience, the original interpretation was aimed rather at finding Marshallian districts of Giacomo Becattini’s variety, than at the comparison of labour market structural features or at the identification of functional urban areas. The (nearly) unanimous reading given to the results of the TTWA regionalisation algorithm applied to Italian data shows this intent clearly enough. However, also in this case one finds a reference to the urban themes beneath (translation by the authors; emphasis added):

[T]he area where the connected enterprise and population system is located is defined as a *daily urban system* (or a local labour “market”, if one so prefers), representing that kind of “common and relatively small” territory within which a contiguity between population and enterprises takes place [...], that together with other daily activities gives shape to a “region” in time and space, under a reciprocal accessibility restriction between residence and workplace. (Sforzi 1987)

3. Materials and Methods

Even taking for granted the “family resemblance” (Wittgenstein 1953) between SLs and cities, it cannot be ruled out *a priori* that the SLs and their persistence are not real, but a delusional effect of the application of methodologies and estimation algorithms. Resolving this dilemma is possible, thanks to the introduction of a new method to define SLs in 2011 and the reconstruction in retrospect of the 2001 SLs according to the new method (Istat 2014a; Istat 2014b). Having three different SLs geographies (those obtained with the 2001 commuting matrix according to the “old” and new method, and the one obtained with the 2011 commuting matrix according to the new method) makes it possible to conduct a “natural experiment of history” (Diamond & Robinson 2011) or, perhaps, a natural experiment of geography.

This approach consists of comparing – preferably comparatively and aided by statistical analyses – different systems that are similar in many respects but that differ with respect to the factors one wishes to study. [...] On reflection, one might also expect comparisons and quantitative methods and statistics to play an uncontroversial middle role in the study of history. Historians are constantly making statements of the form “This changed (or increased or decreased) with time,” or “This was more than that,” or “This person did more (or less) than, or behaved differently from, that person.” But merely to make such statements, without providing the underlying numbers and doing the associated statistics, is to frame the comparison without carrying it out.

We agree, and think the same applies to all humanities and soft sciences, including geography and regional science.

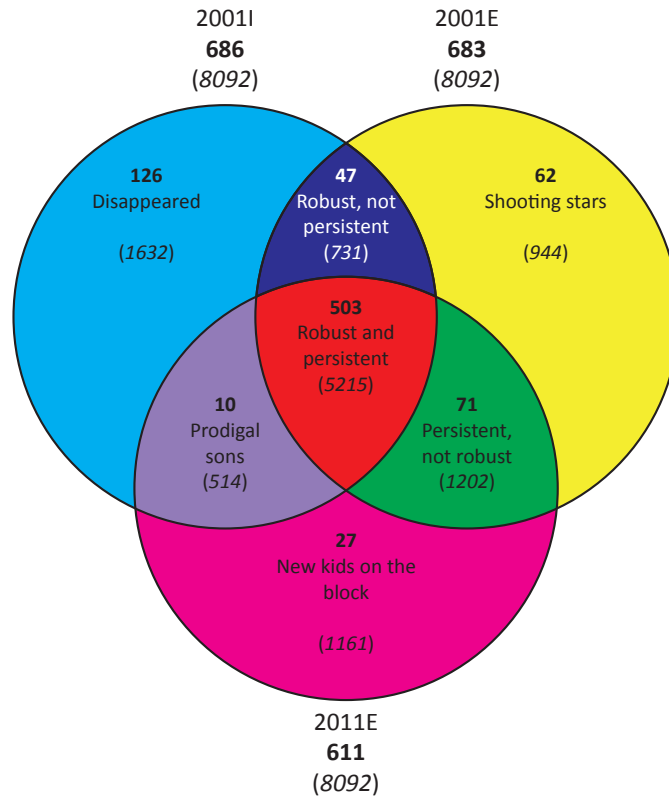


Figure 1: Comparison of the three geographies. 2001 old and new methods, 2011 new method (Venn diagram)

Source: Our calculations on Istat, I sistemi locali del lavoro 2011

Our experiment aims at analytically separating the effects of actual changes between 2001 and 2011 from those that can be attributed to the application of two different algorithms and at measuring their relative importance. It can be made starting from the intersection of the three geographies (the 686 SLs obtained in 2001 with the old method, the 683 calculated in 2001 with the new one, and the 611 identified in 2011) that generates 1,454 different nuclei. Conversely, different combinations of such nuclei can produce, without residuals, the SLs of the three geographies. One or more municipalities compose the nuclei. In order to have a common geographical basis for the analysis, we used the 8,092 municipalities existing at the date of the General Census of 2011 (Figure 1).

4. Results and Discussion

4. 3. Robustness and persistence

A first, interesting result is that 503 nuclei – accounting for 5,215 municipalities with an overall population of more than 47 million residents, almost 80% of the Italian population – exist in all three geographies. More generally, nuclei and their municipalities can be subdivided in five typologies, on the basis of their presence (or absence) in all three, two or one of the geographies (Table 1).

Table 1.

Nuclei, municipalities, population and area by presence in the different SL geographies. 2001 and 2011 (absolute and per cent values)

	Presence in the different SL geographies	Name	Absolute values			
			Nuclei	Municipalities	Population	Area
1.	Present in just one geography (2001 old method, 2001 new method, 2011 new method)	Neither robust, nor persistent	181	430	1.576.048	13.156,65
2.	Present in both 2001 geographies (old and new method) but not in 2011	Robust, not persistent	237	731	2.840.332	23.438,16
3.	Present in both new method geographies (2001 e 2011) but not in 2001 (old method)	Persistent, not robust	357	1.202	5.316.669	44.603,35
4.	Present in 2001 (old method) and 2011 (new method) but not in 2001 (new method)	Prodigal sons	176	514	2.591.604	14.804,50
5.	Present in all three geographies (2001 old method, 2001 new method, 2011 new method)	Robust and persistent	503	5.215	47.109.091	206.070,62
TOTAL			1.454	8.092	59.433.744	302.073,28
Per cent composition						
1.	Present in just one geography (2001 old method, 2001 new method, 2011 new method)	Neither robust, nor persistent	12,4	5,3	2,7	4,4
2.	Present in both 2001 geographies (old and new method) but not in 2011	Robust, not persistent	16,3	9,0	4,8	7,8
3.	Present in both new method geographies (2001 e 2011) but not in 2001 (old method)	Persistent, not robust	24,6	14,9	8,9	14,8
4.	Present in 2001 (old method) and 2011 (new method) but not in 2001 (new method)	Prodigal sons	12,1	6,4	4,4	4,9
5.	Present in all three geographies (2001 old method, 2001 new method, 2011 new method)	Robust and persistent	34,6	64,4	79,3	68,2
TOTAL			100,0	100,0	100,0	100,0

Source: Our calculations on Istat, I sistemi locali del lavoro 2011

Two features of these nuclei (and of the municipalities they are made of) are particularly interesting: their *robustness* and their *persistence*.

Let us define as *robust* the nuclei composed by the same municipalities in 2001, regardless of the method, thus testifying that their classification is not dependent on the changes in the algorithm but only on the data

that describe their relational characteristics in terms of commuting flows. *Persistent* nuclei are instead those composed by the same municipalities both in 2001 (according to the new method) and 2011. Robust nuclei can be persistent (or not), and persistent nuclei can be robust (or not). Thus, robustness corroborates the hypothesis that SLs are the description of phenomena happening in the real world; persistence signals the continuity over the decade of the origin and destination locations of commuting flows.

The simultaneous presence of robustness and persistence qualifies, as we have already seen, a large number of nuclei, that identify as many SLs existing (with their essential nucleus) in all three geographies.

This result leaves little room to the possibility that SLs be the fictitious result of the application of a given regionalisation algorithm: the fact that 503 SLs out of the 611 identified in 2011 existed also in 2001, independently from the method applied, is an important supporting element, corroborating the assumption that SLs are urban forms defined by the intensity of relational fluxes. These 503 represent 35% of all nuclei, but 64% in terms of municipalities, 68% in terms of area, and 79% in terms of population. Evidently there is an unchangeable core of SLs, which constitutes a permanent element of the self-organisation of territories and defines their structural backbone.

Outside of this core, the periphery has ephemeral and fuzzy borders, stemming from more tenuous relationships. We are talking about 2,887 municipalities, complementing the 5,215 robust and persistent ones.

From a geographical point of view (Figure 2), these are mostly municipalities located in the so-called inner areas, along the Apennines range, especially in the South (where 22% of the population lives in these municipalities, as compared to 20% in the Centre-North). Among these one finds also municipalities located at the disputable margins of strong SLs and nuclei. These are qualified by commuting flows that are either smaller, or more fragmented among a plurality of origins and destinations, or both: in the average, commuting flows (measured as the half-sum of inflows and outflows) affect 30% of the population in the municipalities of the robust and persistent set, and 28% in the remaining ones; as to fragmentation, the average number of commuters treading an origin-destination arc is 25 in the robust and persistent set, 18 otherwise. The centrality index³ is barely lower than the average: non-central municipalities are 79.4% in the robust and persistent set, 80.5% otherwise.

³ At the municipality level, the centrality index is the ratio between labour inflows and outflows (excluding workers living and working in the municipality itself). The index will be greater than 1 when inflows are bigger than outflows: in this case, the municipality is “central”, i.e. is an attractor for commuting flows (Istat 2014b).



Figure 2: Municipalities not “robust and persistent” by SL. 2011

Source: Our calculations on Istat, I sistemi locali del lavoro 2011

Anyway, the strongest difference between these municipalities and the robust and persistent ones is the probability to be included in the “reserve list”. The reserve list is defined (Istat 2014b) as “the set of municipalities drawn by more than one attractor or showing weak ties with the dominant SL”. The 2011 “reserve list” contained 1,740 municipalities (21.5% of the total), but among the 5,215 robust and persistent municipalities 869 (16.7%) were in the reserve list, whereas among the remaining ones 871 out of 2,877 (30.3%) were in the reserve list. To sum up, the characteristic that more than others helps identifying this heterogeneous group of municipalities, that we could define marginal and interstitial, is to fall into the attraction range of a plurality of nuclei, but to have strong ties with none.

To contrast this, the strong core of the 503 robust and persistent nuclei is characterised by the very continuity of the relational system that generates and maintains them through time. In order to analyse them more fruitfully, it is useful to specify what defines the identity of a territorial system. The meaning of identity used in this context is not the logical-mathematical one of perfect equality; rather the common one, the one we use when referring to a person’s identity, that is to an entity distinguished from the others and continuous in time. Using this meaning we can also consider the identity of a city, which does not change with demographic or spatial change. This is the sense we use when referring to the identity of this group of 503 SLs, regardless of the fact that they are composed in 2011 by the same municipalities that formed them in 2001, or that they gained or lost municipalities from or to neighbouring SLs.

Table 2.

Local systems, municipalities and population by typology. 2011 (absolute values)

Typologies	Local systems	Municipalities	Population
Robust and persistent	503	5.215	47.109.091
- Unchanged	184	1.351	10.333.346
- Increasing	229	4.680	35.723.843
- Decreasing	90	1.192	8.862.862
Persistent not robust	71	1.202	5.316.669
Prodigal sons	10	514	2.591.604
New (a)	27	1.161	4.416.380
TOTAL	611	8.092	59.433.744

(a) The 27 new SLs stem from adding the 731 "robust not persistent" and the 430 comuni "neither robust nor persistent" municipalities of Table 1.

Source: Our calculations on Istat, I sistemi locali del lavoro 2011

Referring to the inter-census decade (Table 2 and Figure 3) and the new regionalisation method, the SLs which maintained the same composition in terms of municipalities are 184, encompassing 1,351 municipalities and more than ten million residents. Those which grew in terms of extension, attracting municipalities from neighbouring SLs, are 229, where an original nucleus of 3,559 municipalities with almost 31 million inhabitants were joined by another 1,121 municipalities (almost 5 million inhabitants), totalling 4,680 municipalities and almost 36 million inhabitants. The SLs that shrunk, giving up municipal territories to neighbouring SLs, are 90: from an original nucleus of 1,367 municipalities (more than nine million inhabitants) 175 detached themselves (a little more than half a million people), bringing the total in 2011 to 1,192 municipalities and a little less than nine million inhabitants. Even restricting ourselves to the original nucleus of the 5,215 robust and persistent municipalities we are talking about more than 47 million residents, almost 80% of the Italian population.

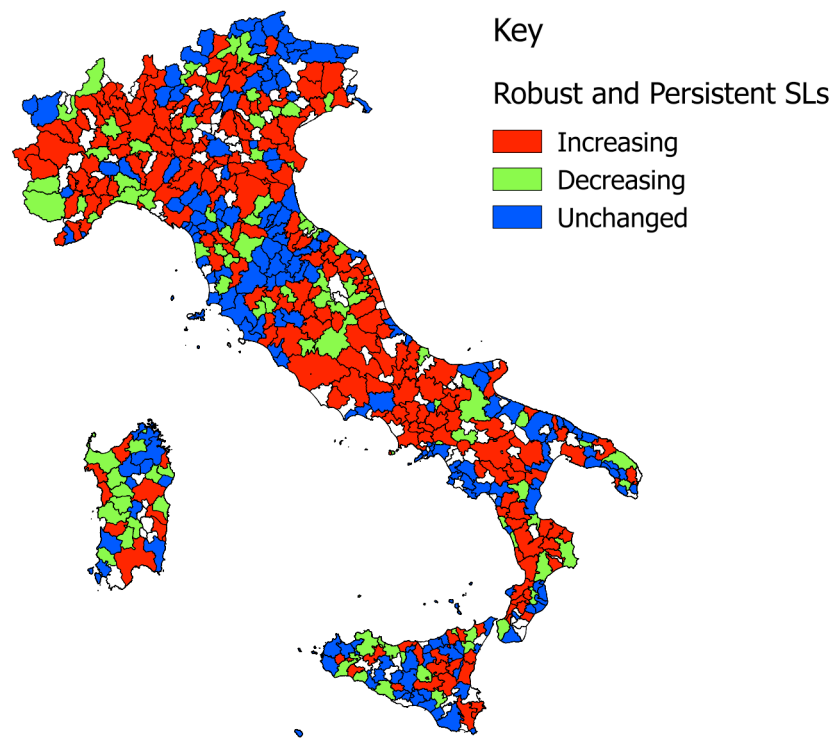


Figure 2: Robust and persistent local systems by typology. 2011
Source: Our calculations on Istat, I sistemi locali del lavoro 2011

4. 3. The SLs as daily urban systems

In order to qualify the urban nature of robust and persistent SLs, it is useful to place them in the context of the characterization of SLs introduced by Istat 2015. On the basis of multivariate analyses, Istat proposes a classification in 7 groups of clusters identified on the basis of socio-demographic characteristics (Centre-North cities, Urban sprawl, Green heart, Southern urban centres, Areas of hardship, Inner South, A different South) and 6 groups of clusters built upon sectoral specialisation (Leather textiles and clothing, Other made-in-Italy productions, Heavy manufacturing, Urban systems, Non-manufacturing systems, System without specialization). The robust and persistent SLs are so many as to be well represented among all groups of clusters. Anyway, a comparison between classifications shows a more pronounced affinity – measured by location quotients – between this group of SLs and those with urban characteristics. With respect to the groups of clusters based on socio-demographic characteristics, the robust and persistent SLs are concentrated mostly in the groups of clusters (LQ 1.08) and, to a lesser extent, in the Areas of hardship (LQ 1.04 e 1,03) and in the Southern urban centres (LQ 1.03); with respect to the groups of clusters based on sectoral specialisation, they are relatively more represented among the Urban systems (LQ 1.07).

Starting from this first result, it is useful to analyse the characters of persistence and robustness of the Italian territorial organisation in relation to the urban issue.

All the SLs identified by Istat from the commuting trips observed in the General census represent daily urban systems (Pumain 2004), at least potentially, provided they meet the self-containment and integration criteria with a sufficiently high relational density. According to our analysis (see above, *Robustness and persistence*) 2,877 municipalities (in 2011 belonging to 108 SLs) do not meet these criteria. On the contrary, the 503 robust and persistent SLs represent the urban scaffolding of the country, formed by centres of

various dimensions, but united by a thick network of trips and relationships that identifies the places where four fifths of the Italian population live and work.

The fact that at the centre of these 503 SLs are as many nuclei with the characteristic of having existed in the past (regardless of the method used to identify them) must not induce one to consider them as a static element, a symptom of paralysis. Quite the opposite. In the last decades, work-related daily trips grew in terms of number, distance and duration. Therefore, the permanence in time of these urban areas highlights their entrenchment in the behaviours and habits of those who live and work in these places, and move within them between a plurality of attraction poles.

In fact, as far as the number of commuting trips is concerned, it grew steadily – particularly in the last inter-census decade – both in absolute value and in relative terms (Table 3). Between 2001 and 2011 overall commuting trips grew from 17 to 19 millions, with a 12.2% growth. As in the same period the population grew by 4.3% and employment by 9.6%, the incidence of the commuting flow on these variables grew as well. If we consider only commuting trips outside the municipality of residence (net commuters), the relative increase is even more evident: this means two things: (1) the number of commuting trips grows, but (2) the proportion of those within the municipality decreases as well. As a consequence, the connections among municipalities grow considerably, by more than a hundred thousands in absolute value and by almost 25% in relative terms. This circumstance has clear implications in terms of demand for transport infrastructure and service, as well as in terms of impact on safety and environment.

Table 3.

Residents, employed persons, commuters and connection between municipalities. 1991, 2001, 2011 (absolute values in thousands and percentage changes)

	1991	2001	2011	1991-2001 change		2001-2011 change	
				a.v.	%	a.v.	%
Population (000)	56.778	56.996	59.434	218	0,38	2.438	4,3
Employed persons (000)	19.675	20.994	23.018	1.319	6,70	2.024	9,6
Commuters (000)	16.957	17.023	19.108	65	0,39	2.085	12,2
Net commuters (000)	6.333	7.166	8.786	833	13,15	1.620	22,6
Links between municipalities	391.284	435.279	538.620	43.995	11,24	103.341	23,7

Source: Our calculations on Istat, Gli spostamenti quotidiani per motivi di studio o lavoro

Secondly, with respect to the increase in distances travelled in the daily route between home and workplace, between 2001 and 2011 the number of people travelling outside the municipality of residence also grows. The quota of these flows on total commuters increased in twenty years from 37.7% in 1991 to 42.1 in 2001, to 46.0 in 2011. This accounts for almost 9 million people, of which 80% is going to another municipality of the same province, while 4% works in another region or abroad. If we focus on the duration of commuting trips, between 2001 and 2011 there was a generalised shift towards longer times devoted to the home-workplace (or home-school) trip: the quota of those taking “up to 15 minutes” to reach their school or workplace decreases considerably, while the percentages of those whose travel time exceeds 45 minutes increase systematically (Figure 4).

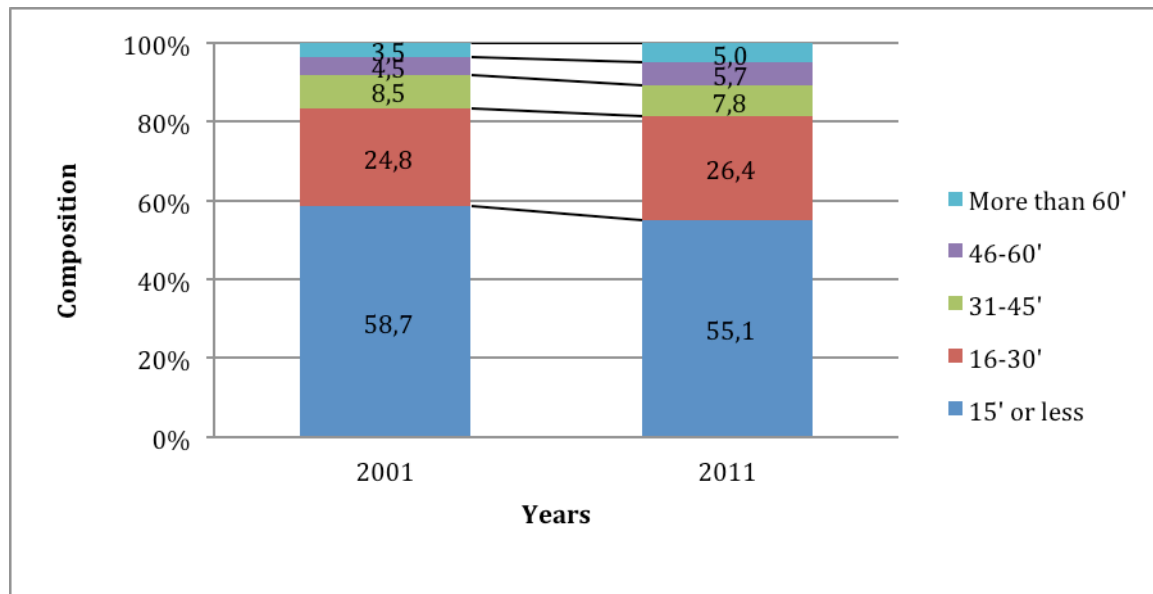


Figure 4: Commuting trips by duration. 2001 and 2011

Source: Our calculations on Istat, Gli spostamenti quotidiani per motivi di studio o lavoro

A plurality of causes influences this phenomenon, common to all developed economies: a higher reliance on private car use with respect to local public transport modes; the decrease of jobs in traditional activities, often located close to residences; the workplaces delocalisation in the suburbs; the tertiarisation (with reference to both economic activities and professions); the presence at home of two or more employed persons working in two different places; the diffusion of more complex working weeks (e.g. working in shifts, concentration of hours, night and holiday shifts, and so on) (Coombes & Bond 2007).

4. 3. The urban issue

The permanence of urban forms represented by the 503 robust and persistent SLs, despite the increase in distances and travel times, brings us back to what has been defined the “central paradox” of the modern city (Glaeser 2011). The cost of connecting places at increasing distances keeps falling, but proximity, density, closeness and absence of physical space increase in value, because they allow interacting, working together, putting into contact ideas, competences, entrepreneurial projects, capitals. The density of urban centres creates revenue and increases the cost of homes and workplaces. In order to compensate the higher cost of living, the workers who live in the city ask for higher wages, and if they get them it is because – from the employers’ point of view – their higher labour cost is more than compensated by their higher productivity. All things being equal (economic activity sector, education, profession, experience), productivity is higher in cities than in the rest of the territory. According to Glaeser’s estimates, in the United States in 2000 employed people living in metropolitan areas with at least one million inhabitants collected an income 31% higher than those living in non-metropolitan areas. Productivity, *coeteris paribus*, was also higher, by 50%.

These results are confirmed, if only indirectly, also in Italy (Table 4): in 2013 the taxable income per taxpayer in the 503 robust and persistent SLs and, particularly in the 229 that attracted new municipalities between 2001 and 2011, is systematically higher than that of other SLs. If one takes the lowest taxable income as a basis, the one observed for the non-specialised SLs (amounting to 13.500 euros, versus 19.600 in the national average), the average taxpayer of the robust and persistent SLs has an income 46.7% higher, a premium increasing to 52% for those living in the ones which attracted new municipalities.

Table 4.

Taxable income per taxpayer by typology and group of clusters. 2011 (absolute values in thousand euros)

	Robust and persistent				Persistent not robust	Prodigal sons	New	TOTAL
	Unchanged	Increasing	Decreasing	Total				
Centre-North cities	20,32	23,77	22,36	23,20	19,52			23,18
Urban sprawl	18,95	20,36	20,63	20,31	19,13		19,24	20,13
Green heart	19,03	19,05	18,54	18,97	17,99	17,85	17,54	18,88
Southern urban centres	17,54	17,14	16,73	17,26	14,66			17,12
Areas of hardship	14,78	17,61	18,47	17,35	13,55			17,19
Inner South	13,68	13,91	13,80	13,82	13,85	12,33	13,13	13,74
A different South	14,35	16,10	16,08	15,63	13,45	14,07	14,29	15,48
System without specialization	13,54	13,56	13,67	13,56	13,40	12,28	12,83	13,48
Urban systems	18,97	21,98	19,97	21,18	17,07			21,13
Non-manufacturing systems	16,49	15,91	16,58	16,31	16,37	15,41	13,88	16,24
Leather textiles and clothing	17,24	19,56	16,60	18,88	17,27		16,16	18,65
Other made-in-Italy productions	18,02	19,33	19,71	19,14	18,21	11,76	18,71	19,02
Heavy manufacturing	18,51	20,23	20,12	19,95	19,00		18,16	19,82
TOTAL	17,66	20,50	19,27	19,77	17,49	13,25	16,08	19,57

Source: Our calculations on tax authority data (Agenzia delle entrate)

The same happens taking into account the groups of clusters built on the basis of productive specialisations: in those classified as urban systems the taxable income per taxpayer is higher than that of all other groups, with a income premium of 56.7% with respect to the contributors of non-specialised systems. Finally, if we shift our focus to the groups of clusters identified on the basis of socio-demographic characteristics, not only the Centre-North cities, Urban sprawl, Green heart, Southern urban centres, Areas of hardship, Inner South, A different South (as one would have legitimately expected), but also the Urban sprawl in the North-East and Centre, have an advantage in terms of yearly taxable income. The cities of the South, however, even those not pertaining to the Areas of hardship, are evidently not able to compensate other localisation and economic disadvantages with economies of agglomeration, neither to attract an adequate contingent of high skills and qualified professions. Thus, they stay below the income of the average taxpayer.

5. Conclusion

Two main – although preliminary – conclusions may be drawn from the research presented above.

The first one is methodological in nature. The introduction of a new regionalisation algorithm for defining the geography of SLs and the availability of geographies based on the same data for the same Census wave allowed us to conduct a natural experiment of history (Diamond & Robinson 2010) or, more precisely, of geography. Before this experiment, one could and – more properly from a scientific point of view – doubt that the geography of SLs was the result of the implementation of a method, i.e. a fiction or merely a model

of reality among others, and not a (more or less) faithful representation of reality itself. Based on the result of our experiment and our analysis, and standing on the outcome of a strong robustness and persistency of SL geographies independently from methods and base years, it is now possible to affirm that SLs are real urban forms, even if the evidence of their existence is made of commuting flows and not of bricks. Of course this result is falsifiable, but it now must be falsified through the tried and tested scientific procedures, and not just through a difference of opinion.

The second conclusion is even more overarching. The geography of SLs, generated by commuting trips, is a (proven) good proxy of daily urban systems, where most activities and interactions among people and economic actors (as revealed by mobility) occur. So, because they are the emerging result of self-organization – spontaneous and largely autonomous self-organization – of these actors, they are a fit basis for observing urban and geographical phenomena in their heterogeneity and their relevant differences, with an approximation of the perimeter of relationships, networks, interchanges and flows defining places better than that allowed by administrative partitions. This perspective, we hope, will lead to further research centred on the urban issue.

6. References

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