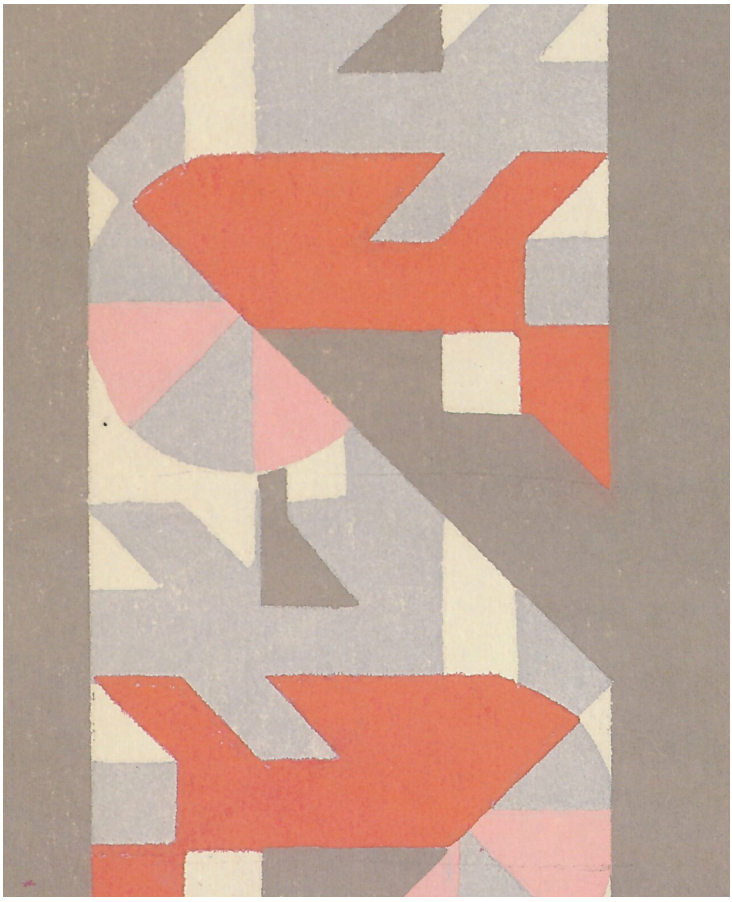
REGIONAL DEVELOPMENT TRAJECTORIES BEYOND THE CRISIS

Percorsi di sviluppo regionale oltre la crisi

a cura di
Marco Bellandi, Bianca Biagi, Alessandra Faggian, Emanuela Marrocu, Stefano Usai



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The Intra-urban Location Rationale(s) of Knowledge-creating Services: Two Italian Case-studies

Fabiano Compagnucci, Augusto Cusinato°, Alessandro Fois°, Andrea Mancuso°, Chiara Mazzoleni°*

Abstract

Recently, a debate has developed within the economic geography about agglomeration economies, which ensues from the transition from industrial to the knowledge-driven economy and from a deterministic to an evolutionary approach. While it is recognized that agglomeration economies are more important than location economies in the new context, their nature is being still questioned, especially between New Economic Geography and Evolutionary Economic Geography. This paper aims at contributing to that debate through novel or barely explored epistemological and methodological approaches. Our results, while confirming the importance of agglomeration economies, shed new light on the role of location economies especially at the intra-urban scale.

1. Introduction

Within the economic geography literature, it is widely accepted that the spatial distribution of activities is mainly affected by agglomeration factors rather than location factors (Ellison, Glaeser, 1999). The nature and the relative weight of the specific agglomeration economies involved, however, are still subject of debate (Phelps, Ozawa, 2003). This debate was launched at the beginning of the 1990s by the *New Economic Geography* (NEG) (Krugman, 1991) which, starting from a general-equilibrium approach, argued that location economies are effective only at the initial stage of industrialization, while agglomeration economies drive, even though unpredictably, the following stages, thus ultimately shaping the real economic geography. The question to be addressed is whether and to what

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extent this model holds also in the knowledge-driven economy. Following the NEG model, in fact, the "Knowledge-Intensive Services" (KIS) based on codified knowledge would locate randomly on space, since transfer costs of information have dramatically dropped thanks to ICT development, or would cluster if they are sensitive to reciprocal proximity[1] or to closeness to public services and infrastructures, especially when temporary proximity matters (Torre, 2008). Conversely, KIS based on tacit knowledge are expected systematically to cluster, even if at various degrees, depending on the trade-off between internal agglomeration economies and proximity to their respective customers and suppliers (who often coincide when information is the traded commodity). Since manufacturing represents a significant proportion of those customers/suppliers (Miles *et al.*, 1995), tacit knowledge-based KIS are ultimately supposed to follow the geography of the manufacturing areas, which is mainly shaped by agglomeration economies. These trends could be enhanced by the fact that learning is a relational practice (Gibbons *et al.*, 1994), and, thus, information exchange could depend on extra-market factors, where non-pecuniary externalities play a crucial role (Arrow, 1973).

These conclusions have been challenged by both Evolutionary Economics (Nelson, Winter, 1982) and the neo-Schumpeterian Economics (Freeman, 2007; McCraw, 2007), which argue that the major concern for firms lies in continuous innovation. It follows that the overall perspective turns from that of achieving a condition of general static equilibrium (including spatial equilibrium) to that of experiencing a continuous non-equilibrium condition. As the lack of any equilibrium prospect prevents us from inferring cause-effect regularities, the key theoretical question regards the possibility of designing intentional behaviour in an evolutionary context. To answer this question, the *Evolutionary Economic Geography* (EEG) identifies two basic laws: (i) the "material cause" of agglomeration economies does not consist mainly in the pecuniary (though cumulative) advantages of proximity, as suggested by NEG, but in firms' capacity to generate local spin-offs; (ii) the presence and composition of related and/or unrelated variety within a certain socio-economic milieu is the place-based factor which mainly shapes that generative power (Boschma, Frenken, 2006). It follows that, unlike NEG, also localized factors matter along the entire lifetime of firms (as well as the related local systems), provided that they refer to complex milieu conditions, rather than to specific pecuniary economies.

The present paper aims at giving a contribution to this debate by ascertaining, first, which of the two approaches fits better the knowledge-driven economy and, secondly, which kind(s) of agglomeration and location economies work specifically in that same context. Considering the sizeable work already carried out in this direction on the supra-urban scales, the paper opts to focus on (a) the

1. Asheim and Gertler (2006) note that also activities based on codified knowledge use tacit knowledge, especially in the explorative phases.

intra-urban scale and (b) a specific KIS classification − the "Knowledge-creating Services" (KCS), as defined by Compagnucci, Cusinato (2014), and further investigated by Cusinato, Philippopoulos (2016) on the basis of an interpretive/hermeneutic view on the knowledge-driven economy, which is alternative to both the excessively vague notion of KIS (Alvesson, 2001) and the excessively high-tech-oriented notion of KIBS (Miles *et al.*, 1995).

The paper is organized as follows. The next Section reassesses the issue of agglomeration economies according to the evolutionary approach, by focusing on KCS at the intra-urban scale. An empirical spatial-econometric analysis, supported by GIS techniques, will then be carried out on two Italian case-studies – Cagliari and Milan – to test the analytical consistency, the heuristic power and the methodological viability of the framed approach in such very different urban contexts. The final section will draw conclusions on the theoretical and normative domains.

2. Agglomeration Economies in the Knowledge-driven Economy

Lessons learned from Jacobs (1961, 1969), Redfield and Singer (1954) and, even earlier, Durkheim (1895) suggest that generative socio-economic effects, albeit resulting from individual rationales and behaviors, ground on structural conditions. Consequently, related and unrelated varieties result also from complex milieu conditions, which cannot be affected directly by intentional individual actions (Cooke, 2018). It also follows that dealing with agglomeration economies from an evolutionary perspective requires *really*[2] adopting a meso-approach, possibly opening to a *Relational Economic Geography* (Sunley, 2008), thus overtaking the micro foundations of the current EEG approach. Actually, the notions of "National System of Innovation" (Lundvall, 1992), "Learning Region" (Morgan, 1997) and "Triple Helix" (Etzkowitz, Leydesdorff, 2000), along with other similar notions which endogenize the evolutionary effects of learning synergies, consider them as depending on the intentional interaction between the actors involved, finally neglecting the role of milieu's structural conditions.

In light of the above considerations, the selection of hypotheses and tests to be used in investigating the issue of location and agglomeration economies is a crucial stage. Regarding the hypotheses, past analysis at the regional and metropolitan scales proved that KIS/KCS location is affected by: (a) urban economies, because of both the cumulative effects cities trigger (Compagnucci, Cusinato, 2016a, 2016b) and the large end-markets they host (Andersson, Hellerstedt (2009); (b) Marshallian economies internal to the same KIS/KCS sector

2. Which means, not only maintaining that the meso dimension matters, as EEG truly does, but also endorsing its disciplinary status.

(Ihlanfeldt, Raper, 1990); and (c) proximity to Hi-tech or Low-tech manufacturing, according to their respective relationship with the analytical or the synthetic knowledge base (Compagnucci, Cusinato, 2016b).

These results corroborate the idea that, in addition to Marshallian economies, also milieu, and, especially, the urban milieu play a crucial role in the knowledge-driven economy. This contradicts NEG's expectations, according to which concentration occurs in whichever region, in favor of the EEG approach, which is more sensitive to localized externalities. Do these results remain valid also at the intra-urban scale, where the impact of local peculiarities might be weaker than at the supra-urban scales, if only because of the shorter distances?

Whilst most of the current works on the intra-urban location rationales deal with manufacturing, the few works regarding KIS/KCS mainly highlight the role of agglomeration and pecuniary location factors at the regional and the metropolitan scales, while shedding only some light on intra-urban economies. Though adopting different methodological approaches (for instance, working on discrete or continuous space), they agree on the fact that KIS based on face-to-face contacts prefer central locations despite the higher rent levels (Ó hUallacháin, Reid, 1992). Central locations, in fact, allow them to benefit from the advantages deriving from higher relational density, economies of scope and prestige (Alvesson, 2001), along with the presence of transport infrastructures, and especially hubs (Arauzo-Carod, Viladecans-Marsal, 2009). So, it appears to be enough room for further exploration of the role of structural/milieu factors or, in other words, of localized generative economies.

Against this background and arguing that, at the intra-urban scale, proximity to manufacturing does not matter substantially, the paper aims at testing the role of urban economies "as a whole"[3] in addition to the standard location and agglomeration economies, by considering the following null hypotheses at the intra-urban scale: a) KCS are not sensitive to urban economies, as a whole; b) KCS are not sensitive to agglomeration economies; c) KCS are not sensitive to pecuniary locational factors.

3. Two Italian Case-studies

The above outlined hypotheses were tested on two Italian Local Labor Systems (LLS)[4], Cagliari and Milan[5], which differ in many respects. Apart from the geographical location (the city of Milan is the Lombardy capital, situated in

3. This expression summarizes the milieu effect, which is reputed to be higher than the arithmetic sum of its components.

4. LLS (*Sistema Locale del Lavoro*) are the Italian version of the Home-to-Work Areas or the Functional Urban Areas (Istat, 2014).

5. From here on, when speaking about "Milan" and "Cagliari", we refer to their respective LLS, if not differently indicated.

Northern Italy, while Cagliari is the capital of the island of Sardinia, in the *Mezzogiorno*), Milan, with its 174 municipalities, 3.7 million inhabitants, 1.7 million jobs and the most advanced manufacturing and service activities, is the Italian economic capital. Its rich infrastructural system along with a long tradition of financial, trade, cultural and scientific relationships with northern Europe have made it one of the main European metropolitan areas. On the other hand, Cagliari is an insular urban reality that counts 42 municipalities, 0.5 million inhabitants, and less than 0.2 million jobs. The differences in wealth conditions are equally important: in 2007, the added value per capita was respectively 34.2 and 20.0 thousand euros in the province of Milan and in that of Cagliari[6], thus mirroring the centuries-old dualism between the North and South of Italy. Finally, from the urban viewpoint, Milan is part of a compact metropolitan system, which covers most of central and northern Lombardy, while Cagliari is a typical central place within a system of surrounding low-ordered urban centers. Despite the differences, these two cities are both specialized in KCS (compared to the national average), albeit at a very different quantitative and qualitative level. The KCS Location Quotient (LQ_{ij})[7] is equal to 2.17 in Milan and 1.23 in Cagliari, even though this specialization mostly depends respectively on the private and the public component of KCS (Compagnucci, Cusinato, 2016b).

Testing the null hypotheses in such different contexts seems thus helpful to ascertain if this kind of services is affected by similar location and/or agglomeration rationales under changing urban conditions. To this extent, we performed an empirical analysis which consisted in: (1) providing a geo-referenced KCS database in both LLSs; (2) defining the intra-urban territorial unit of analysis; (3) rendering the related KCS geography through GIS techniques; (4) performing a spatial-econometric analysis on that geography.

3.1. Data base, Spatial Units of Analysis and the KCS Geography

The universe of enterprises belonging to the different KCS breakdowns[8] (at a five-digit ATECO 2007 detail) and their respective postal addresses were

6. Source: http://sitis.istat.it.

7. LQ_{ij} expresses the ratio between the ratio of employees in sector *i* and residents in the LLS *j*, and the respective national ratio.

8. The KCS classification is as follows: 1) Core KCS: Services whose core activity consists in the governance of creative processes; 2) Core-related KCS: Services whose normal activity consists in knowledge application, which interact systematically with Core KCS; 3) Activities Collateral to KCS: Service or manufacturing activities which technically support the above categories (for more details, see Compagnucci, Cusinato, 2016b). To shed more light on the underpinning spatial rationales, we generally considered two further distinctions: a) Core and Core-related KCS were split into Private and Public, depending on whether they normally work according to market criteria or not; b) drawing from Asheim *et al*. (2011), Core KCS were further classified with reference to their

provided by the Cagliari Chamber of Commerce (Register of Enterprises). Since the Register does not contain professional activities, these latter were drawn from the *Yellow Pages* internet site[9], thus representing only a sample of their respective breakdowns. For this reason and not being aware of the representativeness of those samples, we performed separated analyses for KCS enterprises and KCS professionals. They were both geo-referenced through GIS techniques onto the "OMI Zones"[10] map, along with highway tollgates and underground stations (only for Milan), airports, railway stations for long-distance trains and the two main City Halls, all considered as proxies of intra-urban pecuniary location economies (for details, visit the interactive website: http://kcs.nsupdate.info/).

For each OMI Zone, the *Osservatorio del Mercato Immobiliare* (n.d.) provides the range of the urban rent values, distinctly for apartments/houses, boxes and similar, shops, warehouses, workshops, offices, plants, according to the cadastral classification[11]. In this paper, we considered the "Offices" average rent values expressed in €/m^2/month on July 2017. In order to remove possible incompatibilities with the GIS tools, the geometries of the OMI Zones were reshaped using the ISTAT cartography of the municipal boundaries[12].

Table 1 shows the main features of the two LLSs in terms of OMI Zones, KCS enterprises and urbanized areas. Cagliari counts respectively 164 OMI Zones and about 3,300 KCS enterprises, whereas Milan contains 521 OMI Zones and counts nearly 49,000 KCS enterprises. Total and urbanized areas of each OMI Zone were derived from the land use maps of Sardinia and Lombardy, according with the second level *Corine Land Cover* codes 1.1 and 1.2. What clearly arises from the table is the overwhelming importance of the Milan KCS system compared to Cagliari. Not only does it count almost fifteen times more KCS enterprises, but over twenty times more Core KCS enterprises, a condition that marks its quantitative and qualitative primacy in this sector. As regards the territorial extension, Milan, while having a smaller total area, counts a total urbanized area three times wider than Cagliari.

Figure 1 describes the KCS enterprises location in the two LLSs. The first specificity is that KCS prefer a central location, where their highest density can

knowledge base, if Analytical, Synthetic or Symbolic (see Cusinato, 2016). Owing to constraints in the statistical sources at the intra-urban scale, the present work dealt only with Private KCS.

9. The professional activities considered are as follows: architects, engineers, lawyers, notaries, specialized designers, geologists, translators, psychoanalysts and psychologists, reporters, firm consultants, auditors, professional membership organizations.

10. An OMI Zone is a continuous portion of the municipal area, where the local real estate market can be considered homogeneous (cf. Osservatorio del Mercato Immobiliare [Observatory on Real Estate Market], n.d.). The delineation of the OMI Zones results from the union of one or more cadastral micro-zones, which are sized as a neighborhood, or a district.

11. See http://www.agenziaentrate.gov.it/wps/content/nsilib/nsi/documentazione/omi.

12. Available at http://www.istat.it/it/archivio/24613.

be found. A second feature regards their spatial pattern around the core area, which appears to be hierarchically ordered according to the central-place model. In fact, the most important KCS spatial cluster is surrounded by lower-ordered KCS centres, almost evenly distributed over the space. This is true for both LLS, although at a very different degree (the maximum density at the OMI Zone level is equal to 21.3 KCS/km^2 in Milan and 3.3 KCS/km^2 in Cagliari).

Table 1 – OMI Zones, KCS enterprises and urbanized areas of the Cagliari and Milan LLS

		LLS		
		Cagliari	*Milan*	*Milan/Cagliari*
N° of OMI zones		164	521	3.18
KCS enterprises	Core	1,002	20,372	20.33
	Core-related	1,327	18,223	13.73
	Collateral Activities	941	10,401	11.05
	Total	3,27	48,996	14.98
Areas (Ha)	Total	246,864	183,868	0.74
	of wich, urbanized areas	23,632	69,934	2.96
	Share of urbanized areas %	9.57	38.03	

Figure 1 – KCS Enterprises Location

Cagliari *Milan*

3.2. Spatial-econometric Analysis

The spatial-econometric analysis was split into three sub-steps. The first one consisted in performing the Global Moran Index (*Moran I*) (Anselin, 1995), which found a significative spatial autocorrelation among OMI Zones and KCS density for both KCS enterprises and professionals. The second sub-step was delineating the clusters affected by autocorrelation using LISA (Local Indicator of Spatial Autocorrelation) (Anselin, 1995) (Figures 2 and 3). In both LLSs a single cluster with High-High (HH) KCS density is located in the core area of the municipalities of Milan and Cagliari, indicating the presence of a clear monocentric hierarchical model, while a plurality of clusters with Low-Low (LL) density are located in their outskirts. The main difference between the two case-studies is that in Milan there is a larger "non-significant/sprawled" area between HH and LL clusters, thus outlining a more fragmented geography. In the last sub-step, a maximum likelihood Spatial LAG model (Anselin *et al.*, 2006) – which is a regression model controlling for spatial autocorrelation – was performed. In doing so, we first examined the correlation between KCS density and urban rent at the OMI Zone level. Based on these results, we successively investigated the relationships between intra-urban KCS density from one hand, and agglomeration and pecuniary location economies from the other.

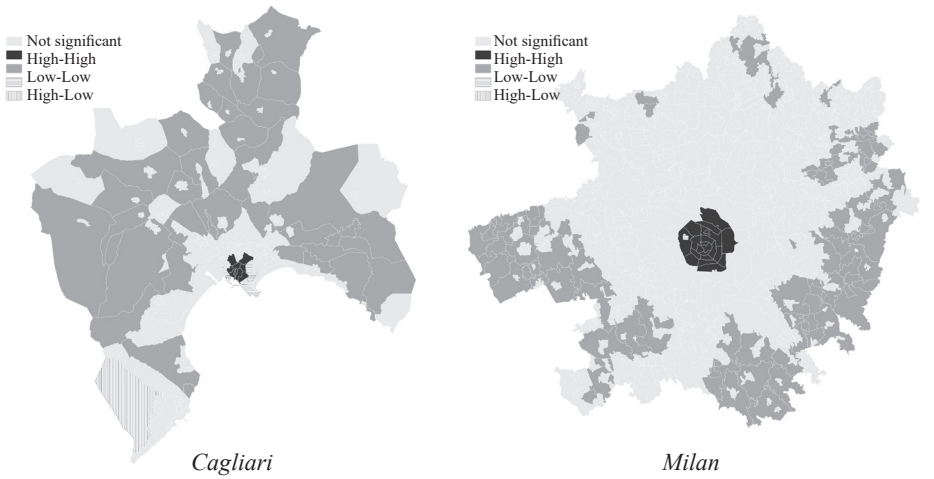
The variables used in the analysis are the following:

(a) "KCS_{ij}–density" is the dependent variable, expressing the KCS density per Ha of urbanized area of the *i-th* KCS breakdown in the *j-th* OMI Zone; (b) "UR_J" is the average urban rent (€/m^2/month) in the OMI Zone *j*, referred to Offices; (c) "$KCS_{\bar{i}j}$–density" is the KCS density per Ha in the *j-th* OMI Zone of the ī-th complementary KCS categories compared to the *i-th* category considered in "KCS_{ij} density"; (d) "$Dist_j$–infras" is the spatial distance between the *j-th* OMI Zone barycenter and, separately, the nearest highway tollgate (only for Milan), airport and the main railway station, used as proxies of the physical accessibility; (e) "$Dist_j$–hall" is the spatial distance between the *j-th* OMI Zone barycenter and the main City Hall within the LLS considered, used as proxy of centrality; (f) "$Dens_j$–metro" (only for Milan) is the density of underground stations, calculated by dividing the number of underground stations in the *j-th* OMI Zone by the value in Ha of its urbanized areas, used as proxy of intra-urban accessibility; (g) "$Dens_j$–pop" is the population density[13] of the *j-th* OMI Zone, calculated on its urbanized areas.

The variable sub (b) expresses the value of the urban agglomeration economies "as a whole"; the variable sub (c), the Marshallian economies internal to the KCS sector; the variables sub (d), (e) and (f) measure the pecuniary urban

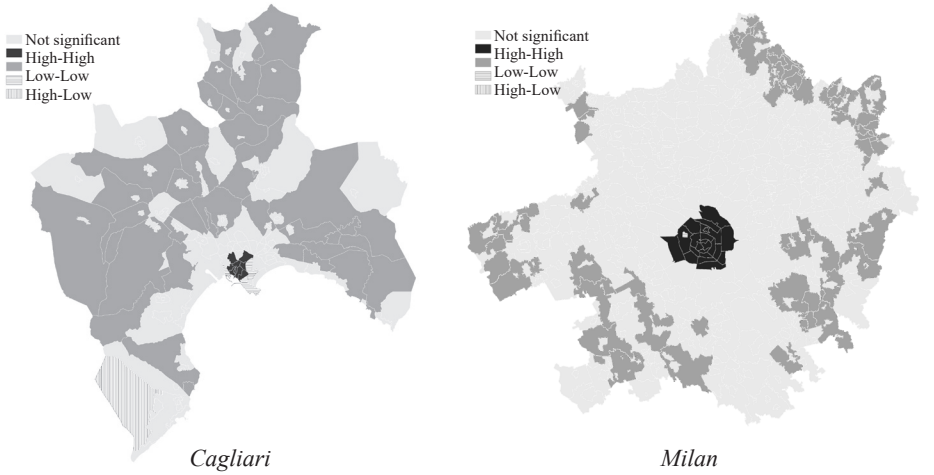
13. Population data were drawn from the Istat website (http://www.istat.it/it/archivio/104317).

Figure 2 – KCS Enterprises LISA Clusters



Cagliari *Milan*

Figure 3 – KCS Professionals LISA Clusters



Cagliari *Milan*

location economies, while the variable sub (g) represents a factor of competition between alternative uses of the urban land. All the variables were standardized.

The LAG model takes the following general form:

$$y = \rho W_y + x\beta + \varepsilon y \qquad [1]$$

where y is the dependent variable; the term ρW_y indicates the weight given to the spatial interaction between the observed variables in any spatial unit. These interactions were summarized into a contiguity matrix W_y. Borrowing from the

chess terminology, the "queen" criterion was used, meaning that two areas were considered contiguous when in direct contact through at least a vertex or a side; $x\beta$ represents the vector of the above listed independent variables; εy is the statistical error.

3.3. Outcomes of the LAG Model

The LAG model shows that there is a significant positive correlation between "KCS_{ij}–density" and "UR_J" in both LLS and for every KCS breakdown, even though the relationship is generally stronger in Milan (Table 2). These results suggest that KCS are willing to pay higher urban rent to benefit from higher levels of urban economies "as a whole". The same consideration holds true for the professional activities, even if, in this case, a bias may arise from the fact that the examined sample could systematically prefer central locations[14].

Table 2 − Spatial LAG Regression between KCS Density and Urban Rent

KCS breakdowns	*Cagliari*			*Milan*		
	Linear coeff.	*LAG coeff.* (ρ)	*p* (α)	*Linear coeff.*	*LAG coeff.* (ρ)	*p* (α)
Private Core, of which:	0.1042	0.7539	0.0005	0.0364	0,8781	0.0000
Analytical	*0.1390*	*0.4416*	*0.0038*	*0.2179*	*0,7056*	*0.0000*
Synthetic	*0.1035*	*0.7454*	*0.0005*	*0.1149*	*0,8694*	*0.0000*
Symbolic	*0.1310*	*0.6931*	*0.0004*	*0.0580*	*0,8872*	*0,0112*
Core-related	0.1329	0.6741	0.0001	0.0997	0,8854	0.0000
Collateral	0.1560	0.6566	0.0000	0.2054	0,7676	0.0000
Professionals	0.0755	0.5748	0.0040	0.3071	0,4160	0.0000

More in detail, linear coefficients do not confirm univocally that especially KCS based on face-to-face contacts (like Symbolic Core KCS) prefer a central location. In fact, Analytical Core KCS, which are mainly based on codified knowledge, show higher propensity to a central location than the former ones, in both LLSs. This behavior could depend on their need for proximity to other research centers, especially universities, as face-to-face contacts matter in their knowledge explorative phases.

Tables 3 and 4 summarize the results of the second step of the spatial-econometric analysis, aimed at ascertaining which specific kinds of externalities drive KCS intra-urban location, be they Marshallian economies internal to the KCS

14. In fact, since registration in the Yellow Pages is upon payment, these Pages are more likely to contain those activities which are more willing to pay in order to appear, which could relate to the willingness to pay urban rent.

Table 3 – Standardized Linear Coefficients of the KCS Enterprises Intra-urban Agglomeration and Location Economies

	Marshallian agglomeration economies						*Pecuniary location economies*						
	Core Analytical	*Core Synthetic*	*Core Symbolic*	*Core-Related*	*Collateral*	*Total*	*Proximity to airport*	*Proximity to rail station*	*Proximity to tollbooth*	*Proximity to city hall*	*Subway stations density*	*Total*	*Population density*
a. Cagliari (n. of obs. 153; p (α) ≤ .05)													
KCS breakdowns													
Private Core, of which:	ø	ø	ø	0.4236	0.4161	0.8397			ø		ø		-0.0640
Analytical	ø	*1.3837*			*-0.3525**	*1.0312*			ø		ø		
Synthetic	*0.1745*	ø	*0.1764*	*0.3923*	*0.1467*	*0.8899*			ø	*-0.0725**	ø	*-0.0725*	*-0.0346*
Symbolic		*0.2857*	ø		*0.6777*	*0.9634*	*-0.1236*	*0.0480**	ø	*0.1090**	ø	*.0334*	*-0.0433**
Core-related		0.5777		ø	0.2753	0.8530			ø		ø		0.0680
Collateral	-0.0615*	0.2460	0.5189	0.2384	ø	0.9418			ø		ø		0.0947
b. Milan (n. of obs.: 521; p (α) ≤ .05)													
Private Core, of which:	ø	ø	ø	0.7709	0.1705	0.9414		-.0057				-.0057	-.0178
Analytical	ø		*-0.1412*	*0.8854*	*0.1308*	*0.8750*		*0.0111*				*0.0111*	*-0.0650*
Synthetic		ø	*0.1341*	*0.8893*		*1.0234*		*-0.0036**			*0.0281*	*.0245*	*-0.0240*
Symbolic	*-0.0908*	*0.7454*	ø	*-0.2597*	*0.3790*	*0.7739*					*-0.0896*	*-0.0896*	
Core-related	0.1146	0.7828	-0.0519	ø	0.0568	0.9023					-0.0417	-0.0417	
Collateral	0.1816		0.4928	0.2568	ø	0.9312		0.0134	-0.0130*	0.0169*	0.0476	0.0649	0.1810

Note: ø: not considered factor; * .05 < p (α) ≤ .1

sector and/or pecuniary location economies. These results allow us pointing out some stylized facts.

First, internal agglomeration economies to the KCS sector (Marshallian economies) significantly affect enterprise location in both case-studies (Table 3). This is corroborated by the fact that the sum of the (normalized) linear coefficients resulting from the regression of a given KCS breakdown on the complementary KCS breakdowns ("KCS_{ij}–density") generally exceeds .85. More specifically, we can affirm that Core KCS are responsive to proximity to lower-ranked KCS, especially to Core-related KCS (except for the Analytical KCS in Cagliari), whereas the correlations between Core KCS sub-categories (Analytical-, Synthetic- and Symbolic-based) are more varied and, generally, weaker.

Second, intra-urban pecuniary location economies do not matter univocally. When positive, the total linear coefficient is lower than .065, meaning that, on average, their impact is about thirteen times lower than the impact of Marshallian economies.

Third, in both LLSs the most sophisticated KCS (Core KCS) compete with household location, while those belonging to the less sophisticated KCS (Core-related KCS and Activities Collateral to KCS) establish a symbiotic relationship with households. These results might imply the working of a gentrification process, which could be fostered, among other factors, by the presence of high-ordered KCS (Mazzoleni, 2012, 2016).

Finally, the KCS professionals (Table 4) follow a similar spatial pattern, except for their negative relationships with Core KCS in Cagliari. Here again, Core Professional KCS compete with residential land uses, whereas no specific intra-urban pecuniary location factor appears to be significant.

Together, the above results confirm that the KCS geography complies basically with a monocentric hierarchical model in both urban systems. With reference to the initial hypotheses, we can therefore conclude that, at the intra-urban scale:

a. the hypothesis that "KCS are not sensitive to urban economies as a whole" is rejected because there is a significant positive correlation between "KCS_{ij}–density" and "UR_J" in both case-studies and for every KCS breakdown;
b. the hypothesis that "KCS are not sensitive to agglomeration economies" is also rejected. In fact, in both case-studies and for most KCS breakdowns, the Marshallian economies represent the most important location factor;
c. the hypothesis that "KCS are not sensitive to pecuniary locational factors" remains ambiguous, since it does not hold significantly true for some KCS categories (although in a different way in Cagliari and Milan), while it does for other categories (again differently in the two LLSs);
d. the most sophisticated KCS compete with residential land uses in both case-studies.

Table 4 – Standardized Linear Coefficients of the KCS Professionals Intra-urban Agglomeration and Location Economies (n. of obs: Cagliari: 153; Milan: 521; p(α) ≤ .05)

		LLS	
		Cagliari	*Milan*
Marshallian agglomeration economies	Core KCS	0.3960	-0.6698
	Core-related KCS	0.2786	10.712
	Collateral KCS		0.1932
	Total	0.6746	0.5946
Pecuniary location economies	Proximity to airport		
	Proximity to rail station		
	Proximity to tollbooth	ø	
	Proximity to city hall		
	Subway stations density	ø	
	Total		
Population density		-0.0602	-0.0820

4. Conclusions

The "KCS intra-urban location rationale(s)" is a cutting-edge research program which is not receiving the attention it deserves because of both theoretical dearth and the difficulties in gathering data. Although at a very preliminary stage, the above analysis showed that KCS location at that scale is much more responsive to Marshallian economies than pecuniary location factors, both in Milan (a Large Metropolitan Area, according to the OECD) and Cagliari (a Medium-sized Metropolitan Area). At first glance, this outcome corroborates the soundness of the NEG approach also within the knowledge-driven economy. However, two other regularities arose, questioning this early conclusion: first, the KCS general willingness to pay urban rent and, second, the competition for the urban space between the most sophisticated KCS breakdowns and residential uses. Jointly considered, these two propensities suggest that both Core KCS and medium-upper dweller classes look for high-quality urbanized areas. This result turns in favor of the EEG approach, since the KCS sensitiveness to urban economies "as a whole", also at the intra-urban scale, rather than to specific pecuniary urban economies, mirrors their responsiveness to place-based generative factors (which are the most complex kind of location economies; Camagni, 2017). This conclusively means that, while admitting that the NEG approach correctly interprets the dynamics of the economic geography within an industry-based system,

it is not equally appropriate when considering the knowledge-driven economy, essentially because of the important role played by the meso dimension and the related place-based non-pecuniary economies it deliberately neglects.

Two main questions, however, deserve further investigation. Having ascertained the importance of both Marshallian economies and urban economies "as a whole" for the KCS sector, it is not yet clear enough whether these two kinds of externalities work consequentially or independently of each other. Since urban economies "as a whole" measure the milieu effect, it is possible to infer that they are the true location driver for knowledge-intensive activities at the intra-urban scale, while the Marshallian economies follow as part of them or as a secondary effect. The subsequent question regards the possibility of splintering that "whole" into its main factors, while bearing in mind that the milieu effect subtends a residual "system factor" that eludes any possible analytical recognition. Referring to the original theory of milieus proposed by Durkheim (1895) and its adaptation to the knowledge-driven economy (Cusinato, 2016), the main problem is to establish a set of indicators to signify and measure "volume/heterogeneity", "relational density" and "place symbolic power" at the infra-urban scale, whose co-working explains the milieu generative power. Whilst suitable solutions can be devised about the first two variables, how to render the symbolic intensiveness of places remains an open question because of its inherent qualitative character, and, furthermore, because it involves the actants' interpretative attitudes, which is a very elusive issue.

Some policy suggestions targeted to the KCS intra-urban location conclude. Acknowledging that the city is the suitable place for this kind of activities, policies should promote their intra-urban location while avoiding possible counterproductive effects, mainly arising from excessive competition with other land uses, and urbanization diseconomies at large, mainly urban polarization. Policies should therefore aim at reconciling the KCS propensity for central location with the necessity to limit congestion costs. Since urban rent consists in a net wealth transfer from the land user (KCS included) to the land owner, which entails lower profitability for economic activities and increasing social inequalities – a market failure, briefly – the main goal for urban policies in this sector is "widening the supply of central places". This implies making a shift from the monocentric urban pattern, which is typical of the KCS spontaneous location rationale, towards a polycentric urban pattern. In the specific case of Milan, such a strategy should consist in moving from the current monocentric hierarchical metropolitan system towards a networked metropolitan system, where various upper-ranked and specialized centralities interact, as it occurs, although to a different extent, in the Munich and the Paris Metropolitan Regions (see, respectively, Mazzoleni, Pechman, 2016; Compagnucci, 2016). A further suggestion

is to avoid specialized zooning within these centralities, by planning mixed and high-quality urban milieus, in line with the studies about the creative class (Florida, 2002) and, more widely, by fostering the urban attractiveness of symbolic activities (for instance, Dembski, 2013; Landry, 2011).

Finally, though relationships with the infrastructural networks and, in general, pecuniary location factors proved to be ambiguous, it seems hard to assume that in-and-out urban accessibility does not matter at the intra-urban scale. A better investigation of this topic represents a further issue for future research.

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Sommario

Le logiche di localizzazione infra-urbana dei *Knowledge-creating Services*: due casi-studio italiani