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Short-term rentals and transformations in urban areas: the case of Turin (Italy)

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Keywords: Airbnb, short-term rentals, spatial analysis, GIS, Microzones, real-estate, decision-making.

Abstract The last few years have been dominated by the spread of digital platforms allowing to connect the offer and demand of goods and services, facilitating either the rise or growth of original economic trends. An example is represented by digitally-enabled peer-to-peer accommodation systems that serve as intermediaries between people willing to rent for short-term periods rooms or entire residential units and travellers preferring to stay in private houses rather than in hotels or other hospitality venues. Short-term rentals represent an opportunity of growth for cities and territories at large, but they are not neutral and related socio-economic effects may vary depending on both the context and the actors involved. The analysis of the characteristics of the phenomenon, including its diachronic evolution and its spatial distribution in urban contexts, may represent a fundamental step to better understand a variety of possible consequences, and it could also inform decision-making and regulations at the local level. The goal of this article is to analyse the characteristics and spread of short-term rental accommodations in Turin (Italy), experimenting the adoption of the Microzones identified by the Turin Real Estate Market Observatory as spatial unit of analysis; more particularly, this approach aims to identify which are the areas of the city that have been particularly interested by this phenomenon, then allowing to suggest possible implications and new research horizons.

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1 | INTRODUCTION: SHORT-TERM RENTALS AND THE AIRBNB PLATFORM¹

The hospitality domain has recently been transformed by the rise and spread of web-based digital platforms connecting people willing to make profitable their under-used real-estate units and users seeking for short-term rentals (hosts and guests, respectively). If, on the one hand, short-term rentals were undoubtedly present in the pre-web era, on the other one it must be said that digital platforms have played a fundamental role not only in matching but also in boosting both the offer and the demand side of this economic phenomenon. In fact, they have provided to potential hosts the chance to easily put on offer their properties and to potential guests the opportunity to stay in accommodations characterized by uniqueness, house facilities and - in many cases – economic convenience. At present, the leader in the field is Airbnb (www.airbnb.com), i.e. a San Francisco-based company which started its activity in 2007 and which assumed its current name in 2009 (Guttentag, 2015). Since then, the number of listings made available on the platform and the amount of economic transitions occurred have grown exponentially: according to Airbnb official figures, the website is currently used in nearly 190 countries and in more than 81,000 cities, for a total of more than 5,000,000 listings worldwide and 300,000,000 people host overall (<https://press.airbnb.com/fast-facts/>).

Given the peer-to-peer nature of the platform – which allows users to be both hosts and guests-, the Airbnb phenomenon has been initially interpreted in light of the sharing economy framework; however, considering that the most common type of property made available on the platform is represented - both at the Italian (Federalberghi, 2016) and at the international level (Ke, 2017) - by entire houses/apartments not entailing the co-housing of hosts and guests, some authors now prefer to define Airbnb as a *disruptive innovation* able not only to modify the hospitality market but also to cause effects on several related fields (Guttentag, 2015).

Coherently with the ever-growing importance of this reality and its multidimensional nature – which encourages the implementation of various research approaches –, this article aims to enrich the emerging literature on digitally-mediated short-term rentals, paying particular attention to the analysis of the characteristics of the listings and to their distribution in the urban context. More particularly, the present contribution aims to propose and apply a set of methodological approaches using Turin – i.e. the capital city of Piedmont (Italy)- as a case study. Capitalizing on geo-referenced data acquired from Airdna (www.airdna.co), this piece of work describes the evolution of the phenomenon in the period 2009-2017, with a special focus on the years 2016-2017. By a methodological perspective, the article also experiments the adoption of the 40 Microzones identified by the Turin Real Estate Market Observatory – *Osservatorio Immobiliare del Comune di Torino* – OICT – (Curto and Fregonara, 2016; Curto *et al.*, 2005) as spatial units of analysis, then presenting some preliminary reflections that take into account the location and characteristics of the properties, as well as the real estate and the long-term rental markets. The overarching goal is to outline an updated picture that could inform local policies, regulations and development.

¹ This article was written as part of the Ph.D. dissertation elaborated by the author (programme in “Architectural and Landscape Heritage” – Politecnico di Torino), supervised by prof. Rocco Curto and Cristina Coscia.

2 | BACKGROUND: LITERATURE REVIEW AND RESEARCH APPROACHES

Since its emergence on the global scene, Airbnb has received great attention from the media, and academic reflections on the topic have started to proliferate particularly from 2015 onwards. The research approaches that have been applied so far are multiple and concern several themes, such as the technical characteristics of the system and the user experience enabled by the platform (Grbovic, 2017), its economic convenience and the possible competition with the hotel sector (Blal *et al.*, 2018; Chen & Xie, 2017), the identification of the most relevant price components (Dogru & Pekin, 2017; Chen & Xie, 2017; Wang & Nicolau, 2017; Xie & Kwok, 2017), consumers' preferences and behaviours (Mody *et al.*, 2017) and the demand segmentation (Guttentag, 2016). In this framework, the literature on the topic has been recently enriched by some studies analysing the distribution of Airbnb accommodations in selected cities and/or in sub-portions of cities (Table 1).

Authors and year	Area of research	Case-study	Main results
Picascia <i>et al.</i> , 2017	Distribution of Airbnb accommodations in a sample of Italian cities; comparison of rental incomes, also considering the distance from the city centre	A selection of Italian cities, with a special focus on Milan, Rome and Florence	<ul style="list-style-type: none"> • Existence of different models of spatial distribution • In some cases Airbnb concentration is higher in proximity of historic centres • Short-term rentals are particularly profitable, especially if accommodations are located in the nearby of the main city attractions • Income inequality exists
Gutiérrez <i>et al.</i> , 2017	Spatial analysis of hotels and Airbnb accommodations	Barcelona (Spain)	<ul style="list-style-type: none"> • Airbnb contributes to the pressure on the city centre
Quattrone <i>et al.</i> , 2016	Location of Airbnb accommodations; identification of hosts' profiles, in light of the socio-economic characteristics of different urban areas	London (United Kingdom)	<ul style="list-style-type: none"> • Entire homes/apartments especially located in proximity of the different centres of the city • Private rooms are also located in areas farer from the city centres • Progressive differentiation of hosts' socio-economic profiles
Schäfer & Braun, 2016	Competition between Airbnb and the regular long-term rental market	Berlin (Germany)	<ul style="list-style-type: none"> • Competition particularly exists for small apartments • Short-term rentals are more profitable • Airbnb accommodations are mainly located in residential neighbourhoods in the proximity of the city core • Airbnb accommodations are especially located in areas experiencing a greater increase of monthly leases
Horn & Merante, 2017	Relationships between the density of Airbnb accommodations and the increase of long-term rental monthly leases	Boston (U.S.A.)	<ul style="list-style-type: none"> • Airbnb density and monthly leases increase in the same areas of the city

Table 1 Airbnb in urban contexts: literature overview - Source: author's elaboration

These emerging perspectives seem particularly promising and up to now they have been adopted especially to: a) understand whether this form of hospitality is facilitating temporary stays in neighbourhoods usually out of tourists' tracks – coherently with the Airbnb philosophy- or whether it is actually contributing to the pressure on city centres and other urban busy areas (Lutz & Newlands, 2018; Gutiérrez *et al.* 2017); b) investigate economic and social impacts (Vacirca & Barioglio, 2016), e.g. identifying recurrent characteristics of hosts (Quattrone *et al.* 2017), describing repercussions on economic sectors related to tourism and hospitality and monitoring local liveability; c) explore connections with the real estate and long-term rental markets (Horn & Merante, 2017).

Regarding the spatial distribution of Airbnb accommodations, recent studies have underlined that the highest concentration rates are usually registered in the residential neighbourhoods located in the immediate vicinity of historic centres and/or of the main attractions of cities (Quattrone *et al.*, 2017; Gutiérrez *et al.*, 2017; Schäfer & Braun 2016). With reference to the Italian context, a tourist city such as Florence typically reflects this pattern; Milan presents a more scattered distribution instead, with peaks in correspondence of the *Isola* and *Navigli* areas; then, a mixed-model can be identified for Rome, with high concentration rates both in the central zones (*Municipio I*) and in other particularly attractive areas of the city (Picascia *et al.*, 2017). As underlined by some authors (Wang & Nicolau 2017), the study of Airbnb locations in cities is still at the beginning and few studies exist on the topic (Gibbs *et al.*, 2018; Gutiérrez *et al.*, 2017); as a consequence, themes such as the influence of the positional factor on night prices and annual revenues will need to be investigated more deeply, as it has already occurred for the hotel and real estate markets instead (Barreca *et al.* 2017a; Fregonara *et al.*, 2012; Curto *et al.*, 2008).

Research approaches aiming at exploring Airbnb-related economic and social impacts have been recently implemented with reference to the city of London (Quattrone *et al.*, 2017); in this study, information concerning Airbnb listings were analysed in light of census data and other metrics deemed appropriate to describe the degree of attractiveness of the different areas of the city. Results highlighted that, in the U.K. capital, Airbnb accommodations are mainly located in zones particularly accessible by public transports and that are inhabited by young people born outside the U.K. and having a job. In an initial phase (2012), proximity to one of the various focal points existing in London represented the condition that mainly affected the emergence of Airbnb accommodations: hosts pioneering the market were young people of different ethnicities living in central areas and possibly characterized by a student status (given the negative correlation with employment). In 2013 the role of location begun to be less prominent, and since that year the phenomenon has started to interest adult real estate owners willing to integrate their income, too.

Other studies have underlined that, in some cities, Airbnb accommodations are currently altering the real estate and long-term rental markets, since all the actors involved compete for the same properties (Chen & Xie, 2017; Gurran & Phibbs, 2017). In this sense, the case of Berlin is emblematic: in fact, in this city the conversion of apartments previously rent for long-term periods into short-term rental accommodations has become a deliberate investment strategy that - according to some estimations- allows hosts to obtain monthly revenues that can amount to even the quadruple of monthly leases (Schäfer & Braun 2016). An association between the growth of Airbnb listings and the increase of monthly leases has been registered in some neighbourhoods of Boston (U.S.A.), instead (Horn & Merante, 2017); even though it is not possible to establish a cause-effect relationship between these two tendencies, it is however legitimate to affirm that both trends occur in the same areas of the city. Additionally, other authors have firstly estimated the capitalization rates of real estate units allocated to short-term rentals in some Italian cities, and then they have compared them with the

ones stemming from long-term leases: results indicate that – on average – the former register a value of 6.2%, whereas the latter show a capitalization rate equal to 2.6% (Sdino & Magoni 2018). Additionally, the profitability of short-term rentals is not only stimulating owners to shift from long-term to short-term rentals but it is also encouraging the acquisition of new residential units to be offered on the short-term rental market.

3 | AIRBNB BETWEEN LOCAL DEVELOPMENT AND POLICY-MAKING

Given the socio-economic implications described above, the spread of the short-term rental market represents a topic of interest not only for customers and private owners, but also for public administrations. On the one hand, the spread of Airbnb may represent an important opportunity for local growth, especially in cities that are trying to expand their appeal for tourists and that do not present a satisfactory or sufficiently diversified hospitality offer yet. On the other hand, its novelty represents a challenge in terms of management and regulation, and in several countries public bodies are currently looking for the solutions that may better balance local development, the liveability of the neighbourhoods and a fair taxation. For instance, in cities that represent worldwide-known tourism destinations and that usually manifest a lack of housing space – such as Los Angeles, New York, San Francisco, Amsterdam –, local authorities have established a cap regarding the number of days per year an accommodation can be put on the short-term rental market. In order to facilitate the multi-dimensional sustainability of the phenomenon, some scholars have proposed to implement regulations that take into account seasonality and the location of the listings, as to mitigate the excessive concentration of Airbnb accommodations in a limited number of urban areas and thus avoid the depletion of the social fabric established by residents throughout the years (Quattrone *et al.*, 2017).

In some cases local authorities have also adopted measures in order to collect daily tourist taxes from Airbnb guests, as it is usually done for people spending the night in traditional hospitality venues such as hotels, pensions and bed and breakfasts. Additionally, in a country such as Italy, some measures have also recently been taken to collect taxes from hosts getting revenues from their hospitality activity (Agenzia delle Entrate, 2017). From a fiscal perspective, the Decree Law n. 50/2017 currently applies in Italy.

This Decree has introduced specific fiscal regulations for the so called “*locazioni brevi*”,² *i.e.* for rentals of residential units lasting no more than 30 days and stipulated from 1st June 2017 (Agenzia delle Entrate, 2017). According to the Decree – which applies when contracts are directly stipulated between the lessor and the lessee but also when they are fulfilled through intermediaries- the lessor can choose between the ordinary taxation and the so called “*cedolare secca*”.

² The Decree Law n.50/2017 applies also when the contract entails services such as the cleaning of the premises, the provision of linen and access to the wi-fi; it does not apply when the lessor provides additional services such as the serving of food, beverages and breakfast, the renting of vehicles, the conduction of tourist guides, etc., which are considered as business activities even if practiced only occasionally (Agenzia delle Entrate 2017, p.3). Since Airbnb business strategies are more and more oriented towards the combination of hospitality and the provision of experiences, it will be interesting to monitor whether the legislation will evolve in order to simplify the taxation of these new forms of hospitality combined with an experiential dimension.

Whereas the former implies the payment of IRPEF and of the regional and municipal surtaxes, the latter establishes a substitute tax (amounting to the 21% of the revenue generated by the short-term rental activity).³

Overall, one of the reasons that may lead to weak regulatory frameworks and wavering urban policies is the lack of a comprehensive - and at the same time detailed- view of the phenomenon. Regulations at the national level are fundamental, but it must also be underlined that development needs may be different in different Regions, cities or even neighbourhoods; as a consequence, specific regulating and management strategies balancing the need for a fair taxation with the development of opportunities for local growth could be adopted.

Even though the regulation of the hospitality activity enabled by peer-to-peer accommodation systems is the outcome of a political choice, the adoption of structured decision-making tools taking into account the spatial distribution of the accommodations, the types of properties involved, the estimation of occupancy rates and annual revenues, together with the characteristics of users and of the generated externalities, may orient local authorities to take informed and data-driven decisions.

As a first step for more integrated and structured decision-making processes, in the next paragraphs a GIS-based approach to the analysis of short-term rentals will be proposed, selecting Turin (Italy) as a case study. Turin seems a particularly appropriate choice since it is an Italian city that has not only known a considerable growth of Airbnb accommodations – as others in Italy (Federalberghi, 2016) – but it also aims to differentiate its touristic and hospitality offer (Centro Einaudi, 2015). Additionally, the awareness and sensitivity towards short-term rentals have recently led not only to the extension of the daily tourist tax to Airbnb guests⁴ but also to the signature of a 3-year agreement between *Regione Piemonte* and Airbnb, which aims to promote collaboration at the local level and to increase monitoring activities (Regione Piemonte, 2017). The presence of studies on the topic may thus contribute to the debate and provide data useful for decision-making.

³ If the contract is stipulated through an intermediary that does not only connect the offer and demand but also makes and/or collect payments – being it a digital platform or not – the 21% tax is retained and deposited by the intermediary itself. In this case the intermediary is required to communicate to *Agenzia delle Entrate* the information and details concerning short – term rentals stipulated since 1st June 2017 onwards (Agenzia delle Entrate 2017, p. 8).

⁴ According to recent estimations reported by the local press (<http://www.torinotoday.it/politica/accordo-comune-airbnb.html>), the extension of the daily tourist tax to Airbnb guests would mean for Turin an additional income of more than 3 million euros per year.

4 | IMPLEMENTING A GROUNDED-RESEARCH APPROACH: THE CASE STUDY OF TURIN

4.1 Goal of the study and research approaches

The goal of the present article is to describe both the characteristics and the spatial distribution of Airbnb accommodations in Turin, adopting as spatial unit of analysis the 40 Microzones (Figure 1) identified by the Turin Real Estate Market Observatory (Osservatorio Immobiliare della Città di Torino - OICT).⁵

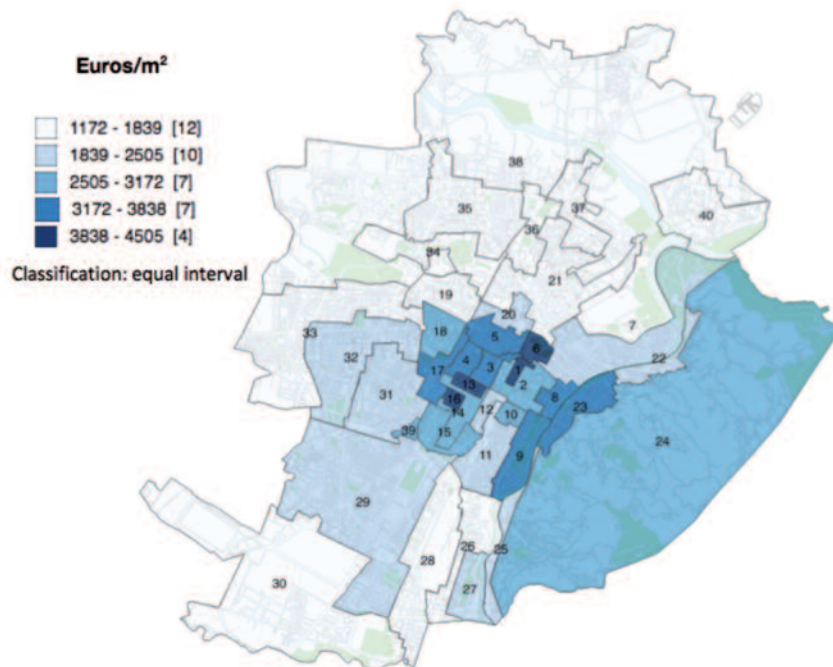


Figure 1 The 40 Microzones of the City of Turin: average list prices (residential segment, used real estate units, 2016)
 Source: author's elaboration on OICT data

Comparing to other studies available in the literature, the choice of adopting the Microzones as spatial units of analysis represents an original research approach, and it can be justified in light of the following reasons:

- the use of pre-determined geographic aggregations can facilitate not only the identification of the location of the points of interest under study, but also the comparison between the areas and the communication of the results (Curto *et al.*, 2009);
- even if the surface of the Microzones is variable (min.: 0.14 Km²; max.: 34 km²), each Microzone is nevertheless such wide that contains a number of observations allowing quantitative analyses; additionally, their width allows to absorb potential errors linked to the georeferencing of the listings;

⁵ For a comprehensive list of the 40 Microzones and their characteristics, please access the website http://www.oict.polito.it/Microzone_e_valori. In order to facilitate the interpretation of the maps presented in the next paragraphs, it might be helpful to recall that the Microzones 6-Castello, 1-Roma and 5-Garibaldi correspond to the most ancient and historically-stratified parts of the city.

- c) Microzones identify homogeneous segments of the real estate market, and average residential list prices (euros/m²) – e.g. with reference to the “used” segment- can be considered as a proxy of the quality and nature of the surrounding urban context (Curto *et al.*, 2005);
- d) the real estate market and its list prices are regularly monitored by the OICT, and updated values are not only available but also freely accessible on the OICT website;
- e) Microzones are also used – in an aggregated form – by the Observatory on the Housing Conditions of the City of Turin (Osservatorio sulla Condizione Abitativa della Città di Torino-OCACT): this allows both to make some considerations on the rental market and to take into account spatial subdivisions such as the homogeneous zones.⁶ (Figure 2).

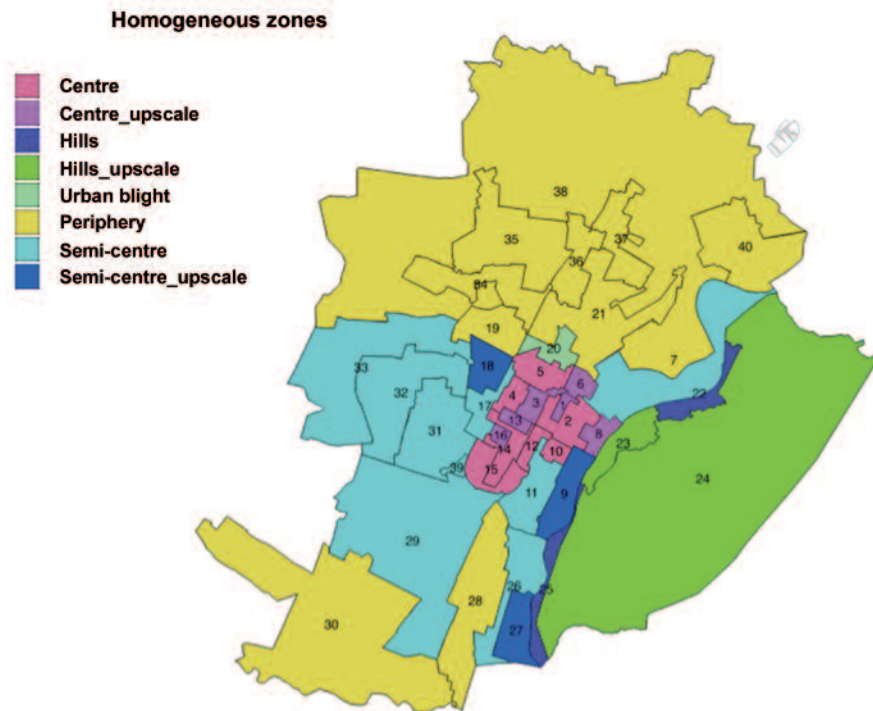


Figure 2 The homogeneous zones identified by the Observatory on Housing Conditions of the City of Turin (OCACT)
 Source: author's elaboration on OCACT data

⁶ The so called “homogeneous zones” were defined to apply the lease contracts established by the Law 431/98, art.2, comma 3 (Città di Torino, 2016); each homogeneous zone is generally the result of the aggregation of several Microzones presenting similar characteristics. Even if the adoption of the Microzones as units of analysis represents an approach that seems worth-exploring for the reasons mentioned in the text, it must be underlined that these areas were defined in 1999, and that since then some changes have occurred in the urban fabric. Some preliminary studies aiming to update these subdivisions have thus been recently conducted by Politecnico di Torino.

4.2 Characteristics and spatial distribution of Airbnb accommodations (2009-2017)

In order to investigate the characteristics and the evolution of the phenomenon, geo-referenced data concerning Airbnb accommodations available in Turin in the period 2009-November 2017 were acquired from the company Airdna (www.airdna.co). The analysis of the data highlighted that, overall, 7,227 listings were published in that timeframe, and that the growth of the listings was exponential. If in the 3-year period 2009-2011 50 listings were present in the Turin market, in 2012-2014 the number of listings newly appeared was 1,264 and in 2015 – November 2017 it amounted to 5,913. Heat-maps capitalizing on geo-referenced data and elaborated with open QGIS software allow to visualize the concentration of the listings by a spatial perspective and to better understand the evolution of the phenomenon through time (Figure 3). In 2009-2011 Airbnb accommodations seem to be distributed in various areas of the city, with a prevalence in Microzone 5-Garibaldi; in 2012-2014 the concentration begins to be higher in three areas, *i.e.* in Microzone 5-Garibaldi and 20-Porta Palazzo, in Microzone 10-San Salvario and 7-Vanchiglia, which all represent either central or semi-central areas of the city.

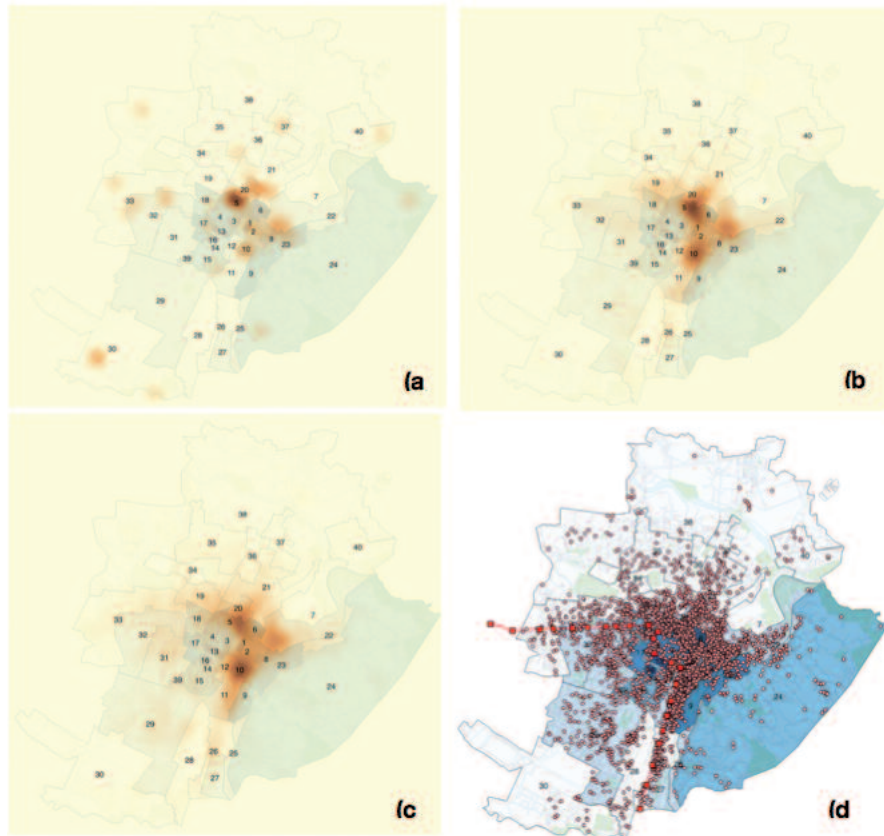


Figure 3 Heat-maps highlighting the new listings appeared on the Airbnb Turin market in the 3-year periods 2009-2011 (a), 2012-2014 (b) and 2015-2017 (c). Image (d) shows the location of single listings existing in 2017; the red colour evidences the track and stops of the underground line
 Source: author's own elaboration on Airdna, OICT and Geoportal of Turin data (<http://geoportale.comune.torino.it/web/>)

In 2015-2017 a similar trend is registered, even if in this case the concentration seems to be even higher in 10-San Salvario; additionally, it is possible to identify the presence of new listings both in less-central areas of the city and in areas that connect the zones that previously manifested a particularly high concentration, as well as in Microzone 11-Dante and 26-Carducci, *i.e.* along the North-South axis of the underground, which connects the Torino Porta Nuova railway station with the Lingotto multifunctional compound.

Even though some Airbnb accommodations are present also along the East-West axis, in this case the trend seems less pronounced.

The diachronic and spatial analysis thus suggests that, after a first phase in which listings were distributed in various areas of the city -with a higher concentration in the central Microzone 5-Garibaldi-, the phenomenon has progressively interested especially the Microzones located in a either central or semi-central position. It is interesting that these last mentioned zones correspond to areas that were interested by renovation initiatives in the relative recent past and/or that are experimenting urban redevelopment projects at present, such as Microzone 5-Garibaldi, 10-San Salvario and 7-Vanchiglia. A special case may be represented by Microzone 20-Porta Palazzo - which hosts the biggest open-air, daily market in Europe-, instead. In fact, the permanent residency in this Microzone - which is defined as an “urban blight zone” by the 1999 OCACT terminology- may sometimes present some difficulties due to the environmental and socio-economic conditions facilitated by the busy daily market; it seems thus plausible to hypothesize that short-term rentals may represent an effective strategy to make more profitable real estate units that otherwise could risk either to be under-used due to a low demand or to be under-profitable, due to the relative low prices of the real estate and long-term rental markets.

In order to better understand the characteristics of the Airbnb accommodations on offer on the Turin market in the above mentioned time frames, geo-referenced data were then analysed considering first of all the types of accommodations on offer (*e.g.* entire home/apartment, private room, shared room); physical characteristics and dimensions of the units were estimated using the number of bedrooms as a proxy, instead. Tables 2 and 3 show the main characteristics of the listings published in the three periods under study.

NEW LISTINGS	before 2012	2012 - 2014	2015 - 2017
Entire home/apartment	66.0%	70.9%	66.6%
Private room	34.0%	27.3%	30.0%
Shared room	0.0%	1.8%	3.4%

Table 2 Characteristics of the listings newly appeared on the Turin Airbnb market, by type
Source: author's own elaboration on Airdna data

ENTIRE HOMES/APARTMENTS: NUMBER OF BEDROOMS	before 2012	2012 - 2014	2015 - 2017
0	12.1%	8.7%	9.4%
1	57.6%	58.5%	63.4%
2	24.2%	26.3%	22.1%
3 - 4	3.0%	6.3 %	4.6%
5 or more	3.0%	0.2%	0.5%

Table 3 Characteristics of the listings newly appeared on the Turin Airbnb market, by number of bedrooms
 Source: author's own elaboration

Percentages referring to listing types (*i.e.* entire home/apartment, private room, shared room) highlight that entire homes/apartments are the most frequent type of Airbnb accommodation; if private rooms represent – in all the three periods considered- nearly one third of the listings newly appeared on the market, shared rooms are a residual percentage, even if a growth has progressively been registered.

With reference to dimensions, it can be noted that entire homes/apartments are mostly real estate units with a limited number of bedrooms, which are thus presumably characterized by small surfaces; more particularly, a unimodal distribution with the peak being registered in correspondence of the one bedroom option has been identified for all the three periods considered. Additionally, it must be noted that the percentage of real estate units with a limited number of bedrooms is also higher when considering studios (coded as having 0 bedrooms). Overall, nearly one quarter of the accommodations has two bedrooms, whereas only a residual percentage (*i.e.* around 5-6%) presents three or more bedrooms. However, it must be underlined that the percentage of real estate units with more than one bedroom is actually higher: in fact, in order to optimize economic convenience and satisfy possible demand's needs (*e.g.* singles, couples or people seeking to save money), some hosts offer different bedrooms belonging to the same real estate unit through different private room listings. Moreover, it is reasonable that also in the case of private rooms rent by hosts in the house in which they reside – following the traditional bed&breakfast model – real estate units present more than one bedroom. However, generally speaking, it can be stated that also in Turin – coherently with other Italian and European cases – small units are the most common type of accommodations interested by short-term rentals strategies not entailing the co-housing between hosts and guests.

4.3 An updated glance to the Turin's Airbnb market: location, characteristics and performances of the listings identified as active in 2016-2017

The study of the spread of Airbnb listings through time undoubtedly represents an essential starting point for the comprehension of the short-term rentals phenomenon; however, another important step of research is constituted by the analysis of the current situation, since it may help support the city's decision-making processes and inform strategies not only about the real estate and long-term rental sectors, but also local policies regarding tourism development and regulation. As a consequence, a multi-perspective analysis concerning the listings scraped as active at the beginning of November 2017, registering at least one year of activity (*i.e.* November 2016-October 2017) and for which prices per night were available was carried out ($n= 1,888$), as to analyse their characteristics and performances over a period of 12 months.⁷ More particularly, the study had the goal to identify the peculiarities of the offer and demand in the various Microzones, as to highlight the articulations of the phenomenon especially by a spatial perspective. Given the number of the Microzones ($N = 40$), it was deemed more appropriate to carry out some analyses using the so called "homogeneous zones", *i.e.* the areas defined by the OCACT and resulting from the aggregation of Microzones presenting similar characteristics.

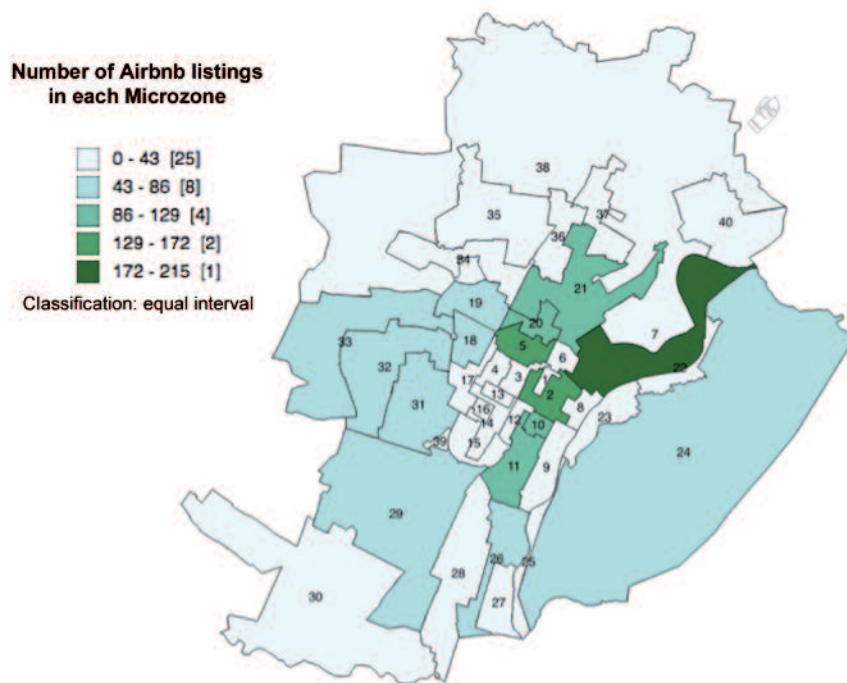


Figure 4 Number of Airbnb listings in the 40 Microzones of Turin
Source: author's elaboration on Airdna data

⁷ The number of listings detected as active at the beginning of November 2017 amounts to about 3,500. The filters described in the main text were applied to the dataset in order to obtain comparable data (e.g. annual revenues), but they inevitably select listings that have been active with a certain continuity and that have been to some extent successful: as a consequence, their performance might be higher than the one that could be registered for the total amount of listings existing on the Turin market.

Descriptive statistics highlighted that the data set confirmed the general trends identified in the previous paragraphs: in fact, entire homes/apartments still represent the greatest majority (72.5%), followed by private rooms (26.1%) and finally shared rooms (1.4%). Additionally, coherently with the results previously presented, 70.0% of the listings are small apartments characterized by 0-1 bedrooms. As evidenced by the map (Figure 4), the Microzones that register a greater number of listings are located in either central or semi-central areas, as the examples of 7-Vanchiglia, 5-Garibaldi and 2-Carlo Emanuele show. Given that the extension of the Microzones is very variable, it was deemed appropriate to calculate density values (*i.e.* number of listings/km²): as shown by Figure 5, the Microzone with the highest density is 10-San Salvario, which thus emerges as a neighbourhood considerably interested by short-term rentals.

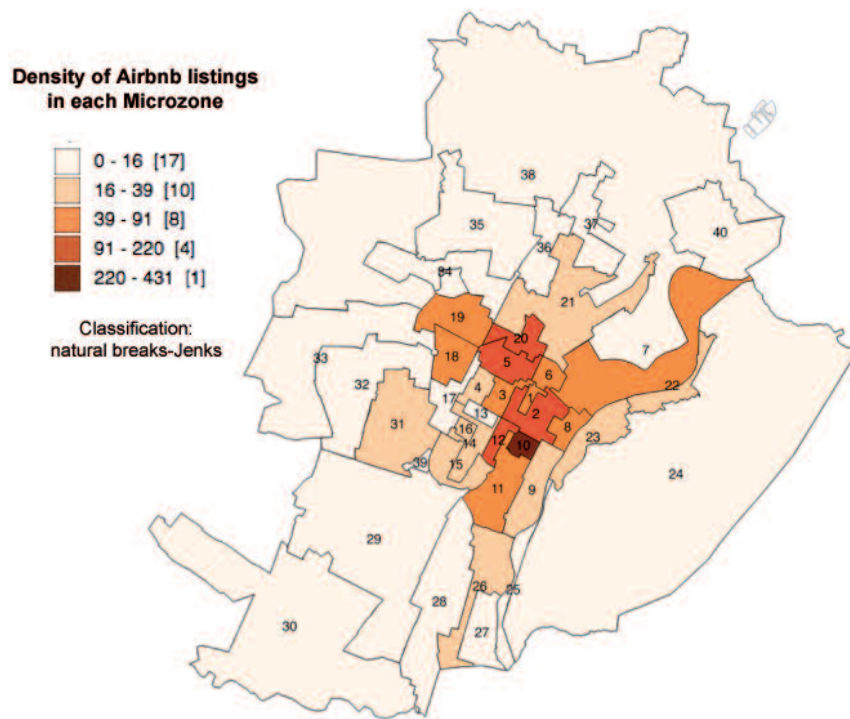


Figure 5 Density of Airbnb listings in the 40 Microzones of Turin
Source: author's elaboration on Airdna data

Contingency tables concerning the frequencies registered for the different listing types (i.e. entire homes/apartments, private rooms, shared rooms) in the different homogeneous zones highlight that, even though entire homes/apartments always represent the majority, higher relative percentages regarding private rooms emerge in the semi-central zones, in the periphery and in the “urban blight zone”; shared rooms are proportionally more frequently located in the periphery, too. Figure 6 provides a graphical outcome of the results.

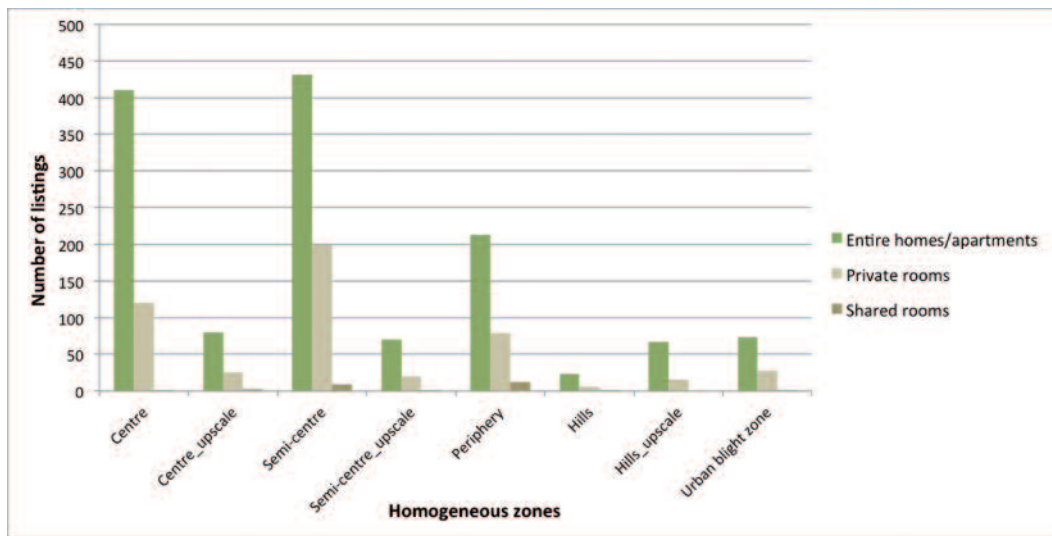


Figure 6 Airbnb listing types in the homogeneous zones: frequencies
Source: author's own elaboration on Airdna data

For what concerns the dimensions of the entire homes/apartments, the smallest units (i.e. 0 bedrooms) are especially located in the city centre zones and in Porta Palazzo (urban blight zone). The few accommodations located on the hillside mainly present only one bedroom, and this kind of unit is actually the most frequent in each Microzone.

NUMBER OF BEDROOMS	Centre (n=411)	Centre upscale (n=80)	Semi-centre (n=431)	Semi-centre upscale (n= 70)	Periphery (n=213)	Hills (n=23)	Hills upscale (n=67)	Urban blight zone (n=73)
0	13.7%	7.5%	6.3%	11.4%	5.6%	0.0%	9.0%	19.2%
1	61.9%	53.8%	65.2%	57.1%	61.0%	87.0%	49.3%	56.2%
2	17.4%	31.3%	23.2%	25.7%	28.6%	8.7%	28.4%	23.3%
3	5.9%	5.0%	5.1%	2.9%	3.3%	4.3%	7.5%	1.4%
4	0.7%	2.5%	0.2%	1.4%	0.0%	0.0%	3.0%	0.0%
5 or more	0.5%	0.0%	0.0%	1.4%	1.4%	0.0%	3.0%	0.0%

Table 4 Characteristics of entire homes/apartments, by number of bedrooms
Source: author's elaboration on Airdna data

The highest average prices per night are registered in the most upscale areas of the centre (M = 91.81 euros) and of the hill zones (M= 88.09 euros); then, they progressively decrease in the central zones (M = 78.23 euros), on the hills (M = 70.27 euros), in the “blight zone” (M = 63.07 euros), in the upscale semi-central zones (M = 61.17 euros), in the semi-central zones (M = 60.69 euros) and finally in the peripheral areas (M = 55.95 euros). This order tends to mirror the one of average market list prices reported for used residential units, but with some exceptions. About this point, the average price per night registered for the so called “urban blight zone” is particularly interesting: in fact, even though it presents relatively low rental and real estate market prices, average Airbnb night prices are higher than the ones registered for zones that are generally considered more prestigious. Moreover, occupation rates and the number of bookings in the twelve months considered are very high, too (Table 5): this suggests that this zone is particularly valued by the guests, maybe for its peculiar characteristics and for its vicinity to the most famous tourist attractions and to the daily and nightly entertainment areas.

The estimations provided by Airdna regarding annual revenues indicate that the upscale central zone is, on average, the most profitable for hosts, whereas the less profitable seems to be the hill zone. However, standard deviation values highlight that the internal variability is extremely high, and further analyses taking into account qualitative elements of the accommodations as well – e.g. the furniture style, the occurrence of recent renovation works, the historicity of the building, the presence of an elevator and the vicinity to public transports – will be needed to better understand the relationship between the offer and demand side and its socio-economic consequences.

Airbnb market (November 2016-October 2017)	Source	Centre (n=411)	Centre upscale (n=80)	Semi-centre (n=431)	Semi-centre upscale (n=70)	Periphery (n=213)	Hills (n=23)	Hills_ upscale (n=67)	Urban blight zone (n=73)
Average price per night (euros)	Elab. on Airdna data	78.23	91.81	60.69	61.17	55.95	70.27	88.09	63.07
Average number of bookings/year	Elab. on Airdna data	37.5	28.4	28.4	28.9	25.1	10.0	19.8	39.2
Average occupancy rate/year	Elab. on Airdna data	48%	43%	50%	52%	50%	33%	44%	53%
Average listing price (euros/m ²), residential real estate “used” segment– year 2017	Elab. on OICT data	2,798	3,970	2,059	2,377	1,470	2,605	2,919	1,695

Table 5 The Airbnb and real-estate Turin market: some data
Source: author’s elaboration on Airdna and OICT data

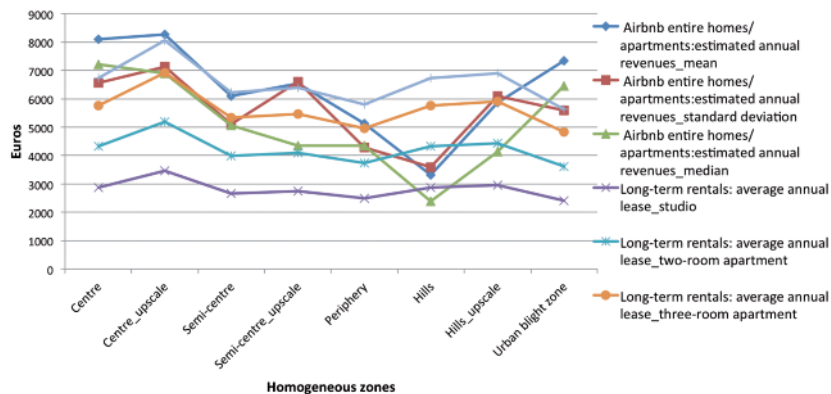


Figure 7 Airbnb and concurred annual rentals: data concerning the different homogeneous zones
 Source: author's elaboration on Airdna and OICT data

However, it must be underlined that these results should be interpreted with a caveat: in fact, it can not be excluded that some hosts might have promoted their accommodations via multiple digital platforms (e.g. websites addressing people looking for longer rentals of entire homes/apartments, systems focusing on luxury houses, etc.) according to their goals, needs and preferred targets; as a consequence, the results presented in this study are an indicator of the success and performance of the accommodations for users of the Airbnb platform.⁸

Finally, the comparison between average Airbnb annual revenues and long-term rentals in the different homogeneous zones (Città di Torino, 2016) suggests that short-term rentals are particularly profitable for small residential units (Figure 7). However, further analyses considering both the leases of the free private rental market and the revenues generated by the short-term rental of residential units of certain dimensions could describe the phenomenon with a greater level of detail. Even though Airbnb annual revenues depend on demand trends and also on the characteristics of competitors, whereas leases usually represent a constant and middle-to-long term source of income, short-term rentals could overall represent a phenomenon influencing the real-estate and long-term rental markets, and a fundamental role will be played by the flows of tourists and business travellers that will be attracted by the city in the near future.

⁸ At the current stage of research it is not possible to estimate the influence of Airbnb algorithms on booking rates of different listings, instead.

5 | CONCLUSIONS AND FUTURE STEPS OF RESEARCH

This article has tried to provide a descriptive overview on the Airbnb phenomenon in the city of Turin (Italy), capitalizing on a set of geo-referenced data to make some preliminary reflections about the characteristics and distribution of short-term rental accommodations. Overall, the study has highlighted that –coherently with the evidence of the literature both at the Italian and at the international level – the phenomenon mainly concerns entire, small, residential units located in either central or semi-central zones of the city; possible consequences may affect long-term rentals (e.g. competition for the same homes/apartments), the real estate market (e.g. small units acquired with the purpose of investment), but also local businesses and economic sectors related to tourism; additionally, an effect on the destination use of specific neighbourhoods can not be excluded as well. Even though further analyses are required to better understand this emerging reality, these preliminary results could enrich the debate about local management and development policies, *i.e.* regarding the potential pressure on the city centre, the implementation of policies favouring temporary residential patterns in more peripheral areas of the city, etc. More specifically, data about short-term rentals could progressively be matched with information concerning the occupation rates of hotels and other accommodation facilities, the number of visitors of museums and cultural attractions in general, the local economic trends and other data regarding the real estate and the long-term rental markets. Another important research field could then also be represented by the analysis of the phenomenon in light of the socio-economic conditions of the areas most interested by the presence of Airbnb accommodations.

Future steps of research should try to forecast future trends of the short-term rental market, and both qualitative and quantitative characteristics of the local real-estate landscape will need to be taken into account as well. Additionally, an in-depth study on the economic and social impacts facilitated by Airbnb in different neighbourhoods could be particularly interesting, since this would allow to understand if and how destinations of use are changing, both at the building and at the city level. Then, a comparison with the locations and occupation rates of hotels could be performed, as to better outline demands' preferences and profiles.

Since the identification of the spatial units of analysis allowing the best explanation of a phenomenon is fundamental and it represents a research-line in its own, future elaborations could focus on the extension of the approaches followed in this article to other spatial units, such as the zones identified by the *Osservatorio del Mercato Immobiliare dell'Agenzia delle Entrate (OMI)* and the so called “statistical zones”, which seem particularly promising due to the socio-economic variables associated to them (Barreca *et al.*, 2017b).

By a methodological perspective, future steps of research could also include the application of geo-spatial statistics approaches (e.g. calculation of global Moran's I, local Moran's I, bivariate analyses...) allowing to identify the possible presence of clusters and to assess their significance (Anselin, 1995; Fischer & Getis, 2009; Barreca *et al.*, 2017b). Point-pattern analyses trying to explain distribution not in light of pre-determined spatial units but considering the spatial relationships occurring among accommodations themselves and between accommodations and certain urban elements (e.g. main roads, underground stations, green and pedestrian areas, rivers, etc.) could be performed, too. These results could help understand not only if, where -and why- new destinations of use of the local real-estate units are emerging, but they could also inspire reflections about policies to be undertaken to guarantee the sustainable development of the city.

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