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Sharing Economy: The Relationship between Airbnb, the Accommodation Industry and New Tourist Flows. The Case of Bologna Metropolitan Area (Italy)

Beghelli, M.*
Unioncamere Emilia-Romagna (Italy)

ABSTRACT

The aim of this paper is to assess the relationship between tourist accommodations managed through sharing-economy portals and the tourist facilities professionally managed (typically hotels) in terms of direct and indirect competition. Moreover, the analysis of the turnover associated with different kinds of facilities bookable on Airbnb, the most widely used sharing-economy portal for tourism, allow to assess the ratio of "*core sharing*" (the sharing-economy in its proper meaning) in Airbnb business and to estimate new tourist flows brought about by the portal. The analysis has been carried out for the metropolitan area of Bologna (Italy) in the years 2015-18. This work shows that only 20% of the turnover recorded by Airbnb in Bologna metro area can be associated to "pure" sharing-economy, meanwhile the remaining 80% have various levels of professional management that, in many cases (though not all), undermine the *peer-to-peer* nature of the relationship established between the parties involved (*peer-to-peer* relationship is a *must* of proper sharing-economy). Of this 80% of turnover, while 44% is associated with facilities that can be considered in direct competition with hotels, 36% is made by tourist accommodations that, to a various degrees, play indirect competition with hotels, thus activating new tourist flows towards Bologna metro area.

Keywords: Sharing hospitality; Sharing economy; Over-Tourism; Urban competition; Bologna

* E-mail address: matteo.beghelli@rer.camcom.it

1. Introducing the sharing-economy

The sharing economy, in tourism as in other sectors, has attracted the attention of many scholars. In this part of the paper the fundamental elements of the sharing economy will be summarized and the ambivalent nature of sharing economy will be introduced. In this *new (digital) frontier*, in facts, behaviours inspired by pure non-profit attitude coexist with practices pursuing totally for-profit goals. Behaviours characterized by various combinations of the two extremes are also present in the phenomenon.

There are many definitions of sharing economy[1][2][3][4] from which we can draw to identify the essential elements of this phenomenon. We can define the sharing-economy as a model of organization for the production and exchange of goods and services that is *based on the access*[5][6] rather than upon property itself. As an example, in the case of car industry the focus of attention is not on the ownership of a car but on the possibility of using it, if and when it is needed.

From this first feature comes another one, the *peer-to-peer collaboration*[7]. In essence, it means that individuals, in an *equal relationship*[8], exchange goods and services so they can be used by those who need them when they are not used by owners.

People linked by emotional ties, such as friends and family members, have always exchanged goods and services with limited, or absent, monetary counter part due to the *spirit of liberality* in force in small human groups that, as such, are able to guarantee *reciprocity* of behaviour. The development of *ICT portals* has allowed the extension of this type of transactions (albeit with some noteworthy distinctions that, however, goes beyond the aim of this work) outside these restricted groups, mainly thanks to the systems of *feed-backs* that allow portals to keep track of the behaviour of the parties involved in transactions. These systems are powerful deterrent to un-wanted free-riding behaviours. Furthermore, platforms strictly monitor the compliance with the rules established (mostly by themselves) for transactions. From all this, the parties involved are granted some level of guarantee that the service will be provided according to expectations of parties involved. As Richardson says, in the interaction between providers and clients through platforms “trust remains important but is built through the technology” and “platforms operate on the basis that trust” that “can be built prior to face-to-face interaction” (Richardson, 2016, p. 9).

This is the genesis of the *"sharing phenomenon" in its most proper meaning* but it should be noted that, while these features are reflected in many cases in day-by-day portals operations, there are other situations in which, behind the facade of the sharing-economy, *goals* and *methods* typical of the traditional economy are applied. *Investigating when one case or the other occurs and what proportion exists between the “name-and-factual-sharing” and the “only-in-name sharing”, is part of the target of this paper.*

A particularly interesting analysis of the double nature of sharing economy is the one provided by Richardson (Richardson, 2016, p. 1): Sharing is "both part of the capitalistic economy and" "an alternative: simultaneously 'neoliberalism on steroids' (Morozov, 2013, The Financial Times) and a remedy for hyper-consumerist culture (Richardson, 2015, pp 121-129)". The author analyses this phenomenon by focusing on the performances of the sharing economy through three crucial points of view*: community*, *access* and *collaboration*.

Community is one of the most used words when referring to sharing economy. In tourism sector, platforms like Airbnb build *communities* which are, formally, horizontally organized and in which every member can be, theoretically, client and provider of the accommodation. This is completely true but it's also true that, as this paper will show, tourism platforms are used – also – by big landlords to professionally rent properties on short-term basis, thus, making the *practice* of sharing hospitality moving away from communitarian spirit of peer-to-peer cooperation and reciprocity to get closer to the traditional for-profit methods and targets.

Access is also a hub concept of the rhetoric about sharing economy. As stated before, in the sharing economy the paradigm shifts from ownership of resources the *access* to them. This sounds good from the environmental point of view as well as economic one: instead of building big new hotels, homes for holidays are used when they are left empty by owners. Instead of producing new cars, the already existing ones are used more intensely, thus reducing the consumption of natural resources and allowing people that can't afford to buy a car to use one when needed. But there are downsides for these advantages that need to be dealt with: the first one is the digital divide within countries and between them. People already left outside of the digital world for lack of reliable and affordable access can be even more disadvantaged than before the net revolution. The second downside is ownership of resources: allowing owners (thus people that already have access to expensive goods and services through property) to profit from resources when they don't use them widens, instead of reducing, the already existing difference in wealth between people potentially making ownership of resources even more concentrated.

Another flag concept in the rhetoric of the sharing economy is *collaboration*. Using portals people collaborate with each other bringing different resources and skills to create products or services. This far is true and is what companies do also in the "traditional" economy. But something needs to be added to the equation: many portals create fragmentation in the "traditional" organization of production, thus making the division of risk and liability associated to the production unclear between parties involved. Often the less powerful parties of the transaction have to deal with greater risks and responsibilities while benefiting less from safety net provisions.

This study, besides to analysing the relationship between sharing hospitality and traditional hospitality in quantitative terms, is an attempt to arrive at an *empirical quantification* of the "core sharing" component of the phenomenon, distinguishing it from the component that passes through the sharing economy portals but belongs to targets and methods of the traditional economy. This quantification was made about

the metropolitan area of Bologna in Italy and is an *empirical* quantification since the above distinction is made using the characteristics of the different types of accommodations that can be booked through portals (with particular reference to Airbnb). It is through the analysis of the features of different categories of accommodations that their economic flows are attributed or not to "core sharing".
The elaborations reported in this paper have been carried out on the basis of data-set provided by AirDNA, a business specialized in the retrieval (through data-scraping algorithms) and marketing of data related to Airbnb platform (For more information about AirDNA, please see paragraph 15).

2. Introducing Bologna as a tourism destination

Bologna does not have a long story as a (leisure) tourism destination but a long story as a town. This mid-sized city (400,000 residents for the municipality and 1 million inhabitants for the province, or "*Città metropolitana*"–Bologna metro area – the new name for the province) is located in Northern Italy and is also capital of Emilia-Romagna region (4.5 million inhabitants). The first settlements of Bologna date back to the first millennium BC. Bologna has been an important urban centre first under the Etruscans and the Celts, then under the Romans and, in the Middle Ages, as a free municipality. Northern capital of the Papal States from the sixteenth century, it played a very important role during the "*Risorgimento"*, the process that carried to the unification of Italian Peninsula into a nation during 19th century.

The industrial development of this part of Italy was relatively *late* (compared to the one of Lombardy ad Piedmont, the first *core* of Italian industrialization) but *strong* and from the end of 19th century Bologna became more and more important as a manufacturing area for machinery and metal products, automation, food-processing, textile and fashion, chemistry and pharmaceutical. Bologna and its region became even more important business centres with the development of an impressive trade fairs sector that attracted business travellers.

Bologna is also home for *Alma Mater, Università di Bologna* (The University of Bologna) which is known to be the first university to be established in western world in 1088 and is considered an important asset for the development of its industrial and trade sector, providing a constant supply of knowledge and managerial skills.

So Bologna, until very recently, was known only as a business, industrial and commercial center so, as a consequence, it was mostly a destination for business tourism with a very small leisure sector. Up to mid 1990ies Bologna was virtually inexistent in the map of Italian leisure tourism. Not with standing that, Bologna has always cultivated its hospitality and openness to the outside world thanks to its University (one of the largest in Italy with almost 100,000 students, the large majority of which from other regions and abroad) and its economic activities that have always attracted workers and business travellers from other areas of Italy and the world. Also

the proximity, geographic and cultural, with the Adriatic Riviera has certainly played a positive role from this point of view with its tradition of hospitality.

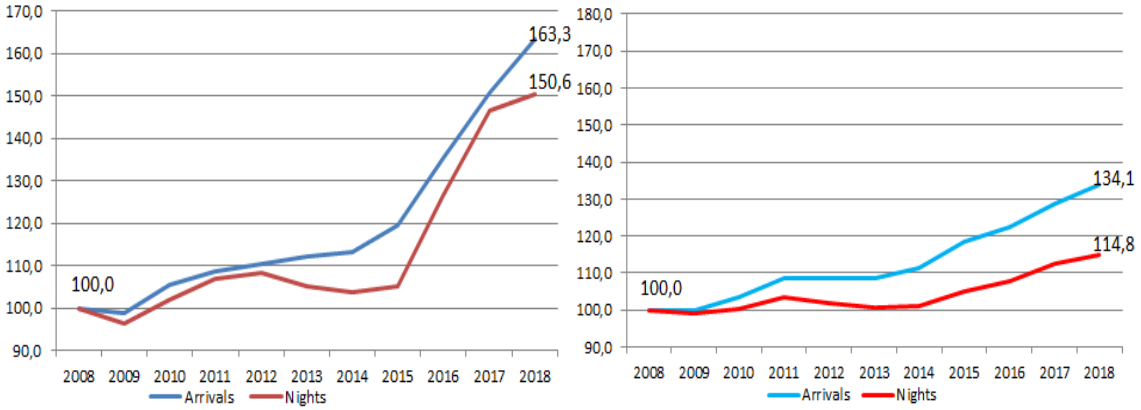

Figure 1. The development of tourism in Bologna province (left) and Italy (right) in terms of arrivals and nights.
Source: Author's elaboration on data provided by ISTAT, the Italian Statics Bureau

All these factors, together with its wide range of historical attractions, have paved the way for the development of incoming leisure travels during the new century making Bologna ready for taking advantage from two interesting innovation. The first one was the development of tourists' interest in *experience-based tourism*, a game-changer that has affected the whole developed world and has directed always bigger tourist flows to towns and cities. Within this general trend, a specific kind of experience has– more recently – gained more importance: the one linked with food and wine tourism that found in gastronomic tradition of Bologna and Emilia-Romagna a mine of experiences to exploit. Another feature of the area that has attracted the interest of experience-based tourism is the strong tradition in automotive industry with *Ducati* and *Lamborghini* headquarters located in Bologna area and *Maserati* and *Ferrari* located few kilometres away.

The second development has been about air travel, in specific the multiplication of air routes following the liberalization of the air travel sector in Europe, which has eased the accessibility of Bologna from all European airports. The Guglielmo Marconi Bologna Airport, originally borne only with trade and business intent, has increased dramatically its leisure passengers. Thanks to the activity of many airlines, regular carriers and low-cost companies, the passengers in 2019 surpassed the record number of 9 million.
The tourism in Bologna is nowadays a profitable combination of business and leisure travel with the leisure demand especially directed to weekends and short-brakes in spring and autumn. The number of arrivals and nights spent in the accommodation industry of Bologna has increased well above the national average from 2008 to 2018[9] (+63% and +34% respectively), especially from 2015 (see the charts in this page) reaching 2.4 million arrivals and 4.7 million nights. This has opened the gate to the development of the new kind of accommodation industry that is the subject of this paper, the sharing hospitality. It has also to be considered that, due to the way in which arrivals and nights are collected (Istat, the Italian National Statistics Bureau, collects

(indirectly) this figures from officially recognized accommodation facilities. Thus, the large majority of sharing hospitality accommodations are not monitored as well as homes for holidays), these figures are underestimated, especially for what holidays' homes and sharing hospitality are concerned. Thus, the real size of increase of tourism flows for Bologna is even bigger than the one that appears from the official figures reported.

3. Airbnb in the Metropolitan area of Bologna: its overall size and the relationship with the "traditional" accommodation industry

The first target of this paper is to assess the overall size of Airbnb in the Metropolitan area of Bologna. In this paragraph, unless otherwise specified, data are related to the bookable facilities, *i.e.* those facilities that have been bookable for at least one night during the year specified.

	Bookable facilities	Averege booked nights per year	Total booked nights per year	Total turnover per year	Average turnover per facility per year	Average rate for one night	% var. of average rate	Number of rooms involved (estemed)	Number of room-nights booked each year (estemed)
2015	2.227	41	92.210	€ 6.117.421	€ 2.747	€ 66,34	n.d.	2.878	115.674
2016	4.247	59	252.507	€ 17.185.413	€ 4.046	€ 68,06	2,6%	5.408	317.432
2017	5.494	74	406.633	€ 29.863.918	€ 5.436	€ 73,44	7,9%	7.110	521.218

Figure 2. Data about bookable facilities on the Airbnb portal located in the Metropolitan area of Bologna. These are the facility bookable for at least one night during the year specified.
Source: Author's elaboration on data provided by AirDNA.

The number of bookable facilities have more than doubled during the examined range of time (2015-2017) and this, combined with the strong increase in the number of average booked nights for each facility as well as increase in the average rate quoted, have made the total turnover of Airbnb facilities in Bologna to grow 5 fold, from 6.1 million euros to almost 30 million euros. More in specific, the growth of average booked nights has supported the (almost) doubling of the average annual turnover for each rentable facility.

Since the micro-data provided by AirDNA were clustered by (the class of) number of rooms for each accommodation facility, assessing the total number of rooms involved in Airbnb has been possible. This number grew from 2.878 to 7.110 in the given period of time, underlying the spread of the phenomenon in the metro area. A direct comparison of this figure to the number of hotel rooms (13.146 for 2017) officially surveyed by Istat (the Italian Institute for Statistics) for Bologna metro area would be

misleading since the booking availability of hotel rooms and Airbnb facility during the year are very different (while hotel rooms in cities are generally always available, facilities bookable through Airbnb are available for rent only when they are not needed by usual inhabitants).

To cope with this difference, the estimated overall number of booked room-nights[10] for Airbnb facilities has been compared to the estimated number of booked hotel room-nights[11]. As a result, in 2016 there was *one room-night booked via Airbnb every 9.7 nights booked at hotels* in Bologna metropolitan area. The result of the same calculation made for the year 2017 was *one Airbnb room-night every 5.5 room-nights booked at hotels*. The official data for the 2018 about hotel rooms are not yet available for the author while this paper goes to press, and neither are AirDNA data about Airbnb. However, it is possible to do some simulations by projecting the trends of previous years on 2018. Thus, it is possible to estimate that *there was a room-night booked via Airbnb every 3.4 room-nights booked in hotel* (to get more information about the procedure followed for the calculation, please see the Methodical Appendix (paragraph 15) at the end of this paper).

These figures show that the extent of *Airbnb is already comparable with the "traditional" (and professional) accommodation industry* (i.e. hotel-like facilities), even if the different availability of rooms for booking during the year is taken into account.

The accommodation facilities bookable on Airbnb platform, besides being distinguished by their number of rooms, also differ by other aspects. In particular, it is possible to distinguish between *entire homes* (homes rentable in their entirety), *private rooms* (rentable rooms inside apartments inhabited by owners or usual tenants) and *shared rooms* (rentable beds in rooms inhabited by the owner or usual tenants).
Given the available data-set, to analyse the different kinds of accommodation facilities monthly data will be used from now on – so that the number of bookable facilities will be the number of facilities rentable for at least one night during a given month. As a consequence, the available facilities for every year will be the annual average of monthly values (Please, take this into account while comparing numbers between different paragraphs of the paper. The turnover instead is always directly comparable though the whole paper)

4. The "hotel comparable" facilities

A type of tourist facilities listed on Airbnb (similarly on other *sharing-hospitality* portals) is more easily comparable to proper hotel-rooms. These facilities consist of *fully-equipped dwellings* that are *studios* or have *one bedroom*. By their very nature, when renting these facilities it is very difficult to share space and time with the owners (or regular tenants) of accommodations, therefore these facilities can be rented for uses very similar to those of hotel rooms. This is the reason why this kind of facilities is referred to as "*hotel comparable*".

The "hotel-comparable" facilities *weigh about one-third of the total available facilities* in the metropolitan area of Bologna. However, they develop a considerable number of facility-nights available (over 301 thousand in 2017) and facility-nights booked (almost 174 thousand in 2017) mainly due to the fact that these accommodation facilities are available for booking, on average, for 20 nights a month generating almost 12 booked-nights a month. It makes *about 141 nights a year booked* (compared to the general average of around 74, as seen before). The fact that this value differs so greatly from the general average opens scenarios of potential direct competition between these facilities and hotels.

	Bookable facilities. Average monthly data	Booked facilies. Average monthly data	Bookable facility-nights	Booked facility-nights	Net utilization rate	Total turover USD	Average daily rate USD
2015	500	315	88.962	42.602	47,9%	$3.455.479	$81,11
2016	842	618	191.078	105.499	55,2%	$8.445.565	$80,05
2017	1.224	971	301.177	173.584	57,6%	$14.778.798	$85,14

	Total turnover EUR	Average daily rate EUR	Average turnover per bookable facility	Average turnover per booked facility	Average bookable facility-nights per month	Average booked facility-nights per month
2015	€ 3.113.041	€ 73,07	€ 6.222	€ 9.870	14,8	7,1
2016	€ 8.445.565	€ 80,05	€ 10.030	€ 13.673	18,9	10,4
2017	€ 13.108.498	€ 75,52	€ 10.712	€ 13.497	20,5	11,8

Figure 3. Data about the "hotel comparable" facilities on Airbnb portal located in the Bologna metropolitan area.
Source: Author's elaboration on data provided by AirDNA.

In fact, this kind of facilities not only provides a privacy level which equals to the one granted by hotels but are – in many cases – *available for renting almost all year long*. This means it's not rare the case of facilities of this kind that are permanently available for rent on the platform. So, there is no sharing space and time with (none) regular inhabitants (the owners live elsewhere permanently) meaning that these facilities, permanently dedicated to short-term rent, are *managed professionally* and not in a peer-to-peer way (and peer-to-peer relationship is at the very core of proper sharing-economy, as seen before). This has been the object of fierce criticism because these facilities are currently subject to a lower level of taxation and are exempted from the observance of some regulations (such as those concerning guests security and privacy) owing to the fact that the renting of private rooms is not considered an entrepreneurial activity for itself (while for the Italian law, as for the ones of many civil-law countries, any economic activity managed professionally makes you an entrepreneur).

The total turnover of these "hotel comparable" facilities exceeds 13.1 million euros, which is *44%* of the total turnover of Airbnb facilities in Bologna metro area. Thus, this

percentage can be taken as a *measure of direct competition between Airbnb and hotel industry* for Bologna. Obviously, it would be wrong to assume that this amount would have been directed, entirely, towards the hotel facilities in the absence of the sharing-economy. However, among the possible comparisons between hotel facilities and those accommodations retrievable on the portals, the one with the "hotel comparable" facilities is, by far, the most fitting one. It follows that a big part of this turnover would be certainly addressed to the facilities of professional hospitality in the absence of the sharing option.

It is possible to compare the weight of "hotel comparable" with that of hotel facilities taking into consideration the different availability rate for lease of the two types of rooms together with the different occupancy rate. A conservative estimate of the room-nights booked in 2016 in the hotel system of the metropolitan area of Bologna is just over 3 million[12]. As for the Airbnb world, the estimate of the facility-nights expressed by "hotel comparables" is equal, in the same year, to 105.499. For the very conformation of these accommodations (they have one bedroom or are studio-like accommodations), the number of facility-nights is equal to the number of room-nights. As a result, in 2016, there was *one night-room booked in a "hotel comparable" Airbnb accommodation every 29.1 room-nights booked at hotels* in Bologna. The outcome of the same calculation made for the year2017 is *one Airbnb room-night each 16.6 nights booked at hotel facilities*. As already been said, the final data on the hotel rooms for the year 2018 are not yet available, and neither are AirDNA data. However, it is possible to do some simulations by projecting the trends of previous years on 2018. From these first estimates it is possible to say that *there was a room-night booked via Airbnb in "hotel comparable" facilities every 10.1 room-nights booked in hotel*.
So, even *confining the comparison between Airbnb and hotel industry* to the field where the competition is more direct (the field of "*hotel comparable*" accommodation facilities) *the extent of the two phenomena is now comparable, especially given the speed of growth of Airbnb "hotel comparable" facilities*.

5. Entire places

The category of "hotel comparable" facilities (entire homes with one bedroom and studio-type facilities) is a subset of the larger category we can be called "entire places". These are entire homes, regardless of the number of bedrooms.
While the public opinion attention towards "hotels comparable" facilities derives from the fact that they can be considered as those that exert the most direct type of competition in relation to hospitality activities carried out professionally (hotels and hotel-like accommodations),the attention to the short-term lease of entire lodgings - regardless of the number of rooms they have - derives from the fact that these accommodations are those that are most likely managed semi-professionally or even professionally. This paragraph tries to understand why.

Since the beginning of the historical series available, the rent of entire homes *represented more than half of the accommodation facilities advertised (i.e. bookable)*

on Airbnb portal in the metro area of Bologna (a bit less than 55% in 2017). *The trend of nights available on average per month per accommodation recalls the above for "hotel comparable" facilities* with values that go from 14.6 nights in 2015 to 19.7 nights in 2017.

The weight of this kind of facilities appears in its true size if the estimated turnover is taken into consideration. Multiplying the number of booked facility-nights for each month for the average rate recorded for the corresponding month, an estimate of the monthly turnover is obtained. By adding these monthly revenues, an *estimate of the annual turnover* is the outcome.

The annual turnover estimated for "entire places" for 2017 amounts to *almost 24 million euros* for Bologna metro area. It was previously highlighted that the annual collection for 2017 of all the accommodations advertised on Airbnb and located in Bologna is close to 29 million and 864 thousand euros. We therefore have that, in 2017, 55.7% of the facilities advertised (or bookable) *generated a percentage that exceeds 80% of the total estimated turnover for Airbnb in Bologna*.

	Bookable facilities. Average monthly data	Booked facilies. Average monthly data	Bookable facility-nights	Booked facility-nights	Net utilization rate
2015	815	481	136.667	60.373	44,2%
2016	1.398	975	303.790	164.461	54,1%
2017	2.011	1.535	478.726	262.652	54,9%

	Average bookable facility-nights per month	Average booked facility-nights per month	Total turnover EUR	Average daily rate EUR	Average turnover per bookable facility	Average turnover per booked facility
2015	14,6	6,5	€ 4.878.522	€ 80,81	€ 5.988	€ 10.148
2016	18,0	9,3	€ 13.396.885	€ 81,46	€ 9.585	€ 13.736
2017	19,7	10,8	€ 23.928.492	€ 91,10	€ 11.900	€ 15.589

Figure 4: Data about “entire place” accommodation facilities on Airbnb portal located in the Bologna metropolitan area.
Source: Author’s elaboration on data provided by AirDNA.

The difference between the weight of these accommodation measured in term of bookable units and in term of turnover depends, firstly, on the average number of *nights in which these facilities are available* for booking (close to 20 units per month) which is far bigger than the average value for the total facilities. Secondly, also the average number of nights for which the advertised accommodations *have been booked (almost 11 in a month)* is higher than the overall average figure. Finally, it is also undeniable the *influence of the rates charged* for the facilities. It should also be noted that *all these variables were increasing during the years considered*. As a consequence to all this, *the estimated average annual revenue per facility advertised of "entire*

place" kind has gone from a little over 5,000 euros in 2015 to almost 12,000 euros in 2017 (figures that are much higher than those that can be granted by long term lease of real estates in Bologna in the same period).

Certainly, a part of these houses are *second homes* that are rented when they are not useful to owners or apartments temporarily empty *waiting for sale* or for *hereditary destination* or following a *temporary* or *part-time moving* to other towns. Many other cases are possible and are consequences into the housing market of life habits that are less and less based on stability and permanence. All these cases, however, have a common feature: *they make real-estates available for rent for a limited number of nights a year,* so these typically sharing reasons to hold houses for short-time tourist lease don't make the majority. As a consequence, *the phenomenon is linked* to the increase in the number of accommodations available for many nights a month, accommodations *whose managers are quite likely to be driven by purposes (and behaviour) more typical of the traditional economy* than those of the sharing-economy.

As specified at the very beginning of this paper, the peer-to-peer economy was originally created to share assets not fully used by owners in a peer-to-peer approach. It was not intended to provide an alternative way to permanently make money out of real estate used for renting without any form of sharing of space and time with owners or regular tenants of the facility. Outside the cases in which the short-term lease of entire homes is related to sharing purposes exemplified before, the short-term lease of entire homes risk to be the permanent destination of a house (also embodying the legal requirements of professional conduct of an economic activity in Italy, making the conditions that justify favourable fiscal measures to fail).*The link between the renting of these facilities and the sharing-economy is therefore fragile* partly explaining the negative attention that some media showed to tourist sharing-economy in general and Airbnb in particular.

The difference between the turnover of a facility rented short-run and long-run determine a *premium for short-run lease* that is particularly high in tourist areas of Bologna where finding a flat for long-term rent is becoming difficult for common people. This is another reason why some media showed negative attention to sharing and Airbnb.

As mentioned, the estimate of revenues for "entire places" is 24 million euros while the one for "hotel comparables" is 13 million euros so the difference between the two values, *close to 11 million euros*, is an estimate of the *annual revenues of the "entire place" accommodations with two or more rooms* for Bologna metro area (corresponding to around 36% of the total revenue for Airbnb).

It can be argued that a *big share of these visitors would not have travelled* in the absence of this kind of accommodations. *When travelling in large groups* sharing-mode facilities allows people to save substantially (and, at least in theory, to have a completely different accommodation experience). In particular, a four-bedroom apartment costs far less than renting four one-bedroom apartments while renting four hotel rooms costs, in general, close to four times the rent of one room. This advantage increases with the number of rooms in the facility rented. If it is true that part of the

group travellers would have opted for hotel solutions in case of lack of sharing mode, it is certainly true that a far larger part of these tourists would not have travelled, or would have gone to other destinations, in the absence of sharing-mode option. As a result, the bigger part of these 11 million euros collected for "entire place" facilities with 2 or more bedrooms are *certainly incremental for tourism flows to Bologna destination*.

Broadly speaking, it can be said that *of the 80% (23,9 million euros) of Airbnb phenomenon represented by "entire place" accommodation facilities, 44% (13,1 million euros) represent a direct competition for hotel facilities while the other 36% (11 million euros) can be considered an estimate of the new tourist flows for Bologna activated by Airbnb.*

6. More "properly sharing" facilities

The available data-set about the private rooms in shared apartments and shared rooms are not as detailed as those relating to the "entire place" and "hotel comparable" accommodations, however some considerations can also be made regarding these facilities that make up the *"sharing-core" of Airbnb business*. Since the total annual revenue for 2017 for Airbnb for the metropolitan area of Bologna is close to 30 million euros and that of the "entire place" facilities, regardless of the number of rooms, is almost 24 million, then the estimate turnover of shared rooms and private rooms for the year 2017 in shared apartments is, approximately, 6 million euros, that is, *about 20% of the total turnover for Airbnb* in Bologna.

This can be considered *the minimum quantification of the most exquisitely sharing part of Airbnb business* since it is the one relating to the accommodations that require, for they very nature, sharing space and/or time with the habitual occupants of the dwelling during the stay of the travellers. The true extension of the "actually-sharing" part of Airbnb will certainly be greater than this core since a part of the "entire place" accommodations, even in the "hotel-comparable" configuration, is certainly made of accommodations rented on a peer-to-peer basis. However, the available data allow us to get to an acceptable quantification only of this minimum core part of the sharing-economy in Airbnb.

Summarizing what has emerged so far from the analysis, it is possible to make a schematic quantification of the impact of the different phenomena behind Airbnb in the case of the metropolitan area of Bologna:

a) 20% of the proceeds are related to the "very-core" of properly sharing activities;

b) The remaining 80% of turnover is related to facilities that, in many cases, give rise to the doubt of professional management (and therefore can't be considered "properly-sharing", since sharing requires a peer-to-peer cooperation);

c) 44% of receipts (part of the 80% referred to in point b) relates to facilities that exert an almost direct form of competition for hotel rooms;

d) 36% of the collections (part of the 80% referred to in point b, as well) are related to facilities that, with a greater degree of probability, generate incremental flows for local tourism flows.

7. The sharing that is becoming less and less peer-to-peer

Among the "entire place" facilities available on Airbnb, some are even less "sharing" and "peer-to-peer" than those analysed in previous paragraphs. Just think of the hosts that promote more than one – sometimes many –"entire place" accommodation at the same time, thus making evident their very nature as professional managers of a proper for-profit economic activity. Or think about those cases in which company staff travelling for work rent an apartment to attend a trade-fair and put the cost to company reimbursement; perhaps an apartment that the owner has entrusted to a company specialized in managing ads, check-in, check-out and cleaning of the premises. Or think about the fact that recently Airbnb also allows hotels – properly defined ones – to promote themselves on the portal. What is it left of "sharing" and of "pee-to-peer" in these accommodation solutions?

The answer is not simple.

If a traveling group of colleagues, willing to attend a fair, lease a whole apartment, at the expense of their company, from an owner who has entrusted it to a specialized company, we are quite probably *out* of the sharing-economy. If a single person travels for work renting a single room in an apartment shared with regular dwellers are we outside or within the borders of the collaborative economy?
It is easy to understand how this tendency contributes in making increasingly difficult to draw a boundary between the collaborative economy in proper sense and the traditional economy. These two become *the extremes of a continuum of reality in which the two natures mix with varying gradation*.

8. Less and less sharing: multi-listings and margins that leave the territory

The fact that a flat permanently used for short-term rent risk to embody the features of professional management of economic activity has already been mentioned. Let alone the fact that this risk increases disproportionally with *the number of real-estates managed by hosts*.

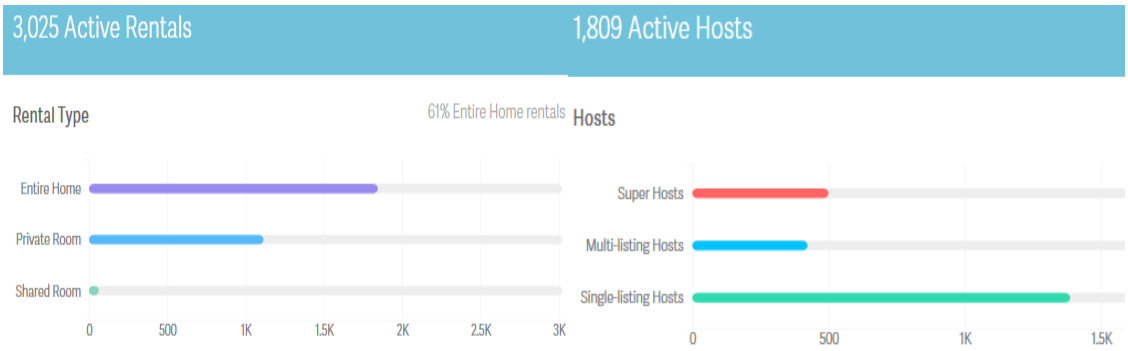

Figure 5: Characteristics of the advertised facilities located in the Municipality of Bologna
Source: AirDNA, Market overview for the Municipality of Bologna.

According to data on the territory of the Municipality of Bologna (not the whole metro area, just the Bologna municipality) and provided by AirDNA for the Airbnb portal, on February 23, 2018 there were 1,809 different advertisers active for 3,025 accommodations advertised. This is an average of 1.67 facilities per advertiser. The average figure is produced by 46% of advertisers with single facilities and by 54% of advertisers who promotes more than one. Thus, multi-property hosts are very common in Bologna as in many other towns and cities around the world. The more property managed at once by a host, the less the situation looks like a proper-sharing transaction.
A further consequence for the territory of the use of sharing-economy platforms, in the case in which these platforms are not based in the European-Union, consists of the fact that a *percentage of the proceeds corresponding to the commissions for portals leaves the territory and won't come back*. This means that a non-negligible part of margins generated by an activity carried out in a country is not reinvested within its borders. In the case of Bologna metro area, applying the fees declared by Airbnb to the figures calculated above, it's possible to get to an estimate of fees collected by the portal. The estimate is (a little bit less than) 4 million euros on (a little less than) 30 million euros of total collection. This money is leaving the country and *won't be reinvested in, as an example, the modernization of local tourism industry* to the detriment of the development of the sector itself and the whole local (and national) economy.

9. Other portals for tourist sharing-economy in Bologna metro area

Airbnb is not the only short-term rental portal operating in the metropolitan area of Bologna. There are others for which we can hazard an estimate by drawing on an empirical audit (made by the office of the author of this paper).

In order to investigate the proportion between those tourist accommodations promoted on Airbnb and the other portals, the offices Of Unioncamere Emilia-Romagna made a "pilot-drill" that took into consideration, for the metropolitan area of Bologna, the municipality of Imola, the second biggest one. The platforms that are

believed to be the most used, in the light of the indications published on the media from July 2017 to the end of this work, have been investigated. Airbnb apart, *the portals that have been investigated are VRBO, Home away, House Trip, Holidu, Windu, Home To Go*.

The survey has shown that *60% of the facilities were present also - or only - on Airbnb, while 40% of them were not present on this portal*. Clearly, without having any indication of the room-nights available for these facilities and the relative occupancy rate, we can't assess the weight of the accommodations that are being promoted outside Airbnb. However, this first indication allows us to conclude that *there is a further cluster of tourist facilities that goes beyond the measurement carried out in the previous pages and, therefore, increases the incidence of the so called sharing-economy on the tourism sector* of the metropolitan area of Bologna.

10. Sharing-economy in countryside and urban areas

The *spread of sharing-economy in non-densely populated area can be very good for local tourism development*. In these areas the tourist flows are, in general, not enough intense to sustain the development of professionally managed tourist accommodations, like hotels, so the short term tourist rents make this areas reachable by tourists that, otherwise, would have visited them on a commuting basis from the closest hotel, or not visited them at all. Since that, for these destinations *all flows generated by sharing-accommodations are incremental for local tourism*.

The spread of tourist short-time rent provides *supplementary earnings* for residents of these areas avoiding the depopulation of economically marginal areas that are culturally interesting and/or have interesting landscapes. This phenomenon crosses with another one: the development of *experiential tourism*. Over the last few years tourists are looking for "real" experience during their holidays, especially when travelling in non-urban areas and properly-sharing economy is ideal in providing authentic experiences.

City	% Housing stock 2015	% Housing stock 2016	Variation 2015-2016
Bari	0.80%	1.00%	25.00%
Bologna	1.00%	2.40%	140.00%
Catania	1.40%	2.20%	57.10%
Firenze	11.10%	17.90%	61.30%
Genova	0.60%	1.00%	66.70%
Matera	17.30%	25.30%	46.20%
Milano	1.70%	3.60%	111.80%
Napoli	1.00%	3.10%	210.00%
Roma	7.10%	8.00%	12.70%
Siena	2.50%	4.00%	60.00%
Torino	1.00%	2.80%	180.00%
Venezia	6.10%	8.90%	45.90%
Verona	2.20%	4.10%	86.40%

Figure 6: Percentage of town-centre housing stock bookable on Airbnb and percentual variation 2015-2016
Source: "Airification" delle città: uno studio sull'impatto degli affitti a breve termine", University of Siena, from "Il Sole 24 Ore"

The spread of this form of rent in urban areas, *especially of economic dense ones, work in a completely different way*. Here, tourism is only one of the possible destinations of real estates and the spread of tourist sharing-economy is competing with other economic destinations of tourist valuable areas making prices to soar.

This phenomenon has already reached considerable intensity in many cities, including Italian ones. According to a study conducted by the University of Siena, already at the end of 2016 (and not yet updated), full housing offerings on the Airbnb portal *amounted to 25% of the housing stock available in the historic centre of Matera*. This percentage was equal to 18% for Florence, 9% for Venice and 8% for Rome. If the percentage of Matera can be considered strongly influenced by the small size of this town and by the fact that its historical centre has (almost) only tourist usability, the same cannot be said for the other Italian cities mentioned.

The percentage referring to the centre of Bologna in 2016 was just 2.4%, therefore much lower than that of the cities mentioned. However, if we consider that it was 1.0% in 2015, it is clear that the increase in just one year was more than remarkable (+140%). If we add the fact that 2017 marked a further significant increase in the facilities advertised in the municipal area, and therefore also in the historic centre, it is reasonable to expect that the percentage in question has further increased.

The historical centres of many cities, therefore, are *turning into areas where almost no one resides permanently or semi-permanently* and the population changes continuously following the tourist flows, radically changing the urban sociology not only of the

centre but of the entire city, breaking - or attenuating - the typical functional link between the central area and the other districts of a town.

The services and commercial activities located in these areas are likely to be more and more targeted to tourists (especially if high-spending) and less and less to inhabitants (of the centre or other districts). A historical centre with a cost of living more linked to that of other tourist destinations and the countries of origin for travellers than to other neighbourhoods. A centre in which economic activities, in search of bigger profits, are increasingly directed towards the service of travellers and less and less to the service of the inhabitants of the area and other part of the city. A centre, therefore, less and less visited and experienced by local population and in which, therefore, the business activities can't do anything but direct themselves to travellers in a phenomenon that develops in a spiral and that, exceeded a certain level, is self-feeding. A "*centre less central"* to the town, it could be said.

11. The economic premium for short-term rentals

There is an economic reason that explains why short rentals tend to be concentrated in the historical centres of the cities. In the case of Bologna, while in the non-central areas, the income guaranteed by long-term and short-term rentals are, at current conditions, generally comparable, in central areas the economic advantage deriving from short-term rentals is significant, despite the relatively-high level of long-term rent fees. In the central areas, this differential is such as to persuade owners to convert their real-estates to short-term rentals. To realize this, it is possible to refer to a differential example that compares the yields of the two types of leases (short and long term) in two areas of Bologna.

A property used as a short-term lease through sharing-economy portals can be managed in very different ways. In the example of this paper, the two extreme cases of the spectrum have been examined: a totally "internal" management in which the activities of insertion and feed-back, check-in and check-out, cleaning, reordering and replacing the laundry are carried out directly from the property. A second type, completely "external", in which all the activities just mentioned are carried out by an external subject remunerated for this with a percentage of the proceeds[13].

The net amount which is attained with this calculation is not the effective net income for the owner since other expenses should be deducted, such as taxes on the property and extraordinary condominium expenses since they would still be charged on the property of the real estate, and always with the same amount, regardless of the type of rental used for the same or the fee charged. Therefore, it is a net income determined with the sole purpose of allowing comparison, in purely monetary terms, between long-term and short-term leases. This is why the collection is called differential net and not net earnings (See the simulation of differential yield in these pages).

SHORT-RUN RENT: "ENTIRE PLACE" APPARTMENTS WITH TWO BED-ROOMS ON AIRBNB IN BOLOGNA MUNICIPAL AREA

App.t location	Average daily rate 2017	Booked nights	Gross revenue	waste tax	income tax	Portal fees	Utilities	Ordinary condo. expenses	City tourism-tax	Management company fees	total differential costs by type of management		DIFFERENTIAL NET
"not specified"	€ 110	138	€ 15.205	€ 220	€ 3.193	€ 760	€ 804	€ 1.300	€ 760	€ 0	Internal	€ 7.037	€ 8.167
		37,9%		idem	idem	€ 0,00	idem	idem	idem	€ 4.561	Extenal	€ 10.839	€ 4.366
Central Bologna	€ 154	194	€ 29.801	€ 220	€ 6.258	€ 1.490	€ 804	€ 1.300	€ 1.490	€ 0	Internal	€ 11.562	€ 18.239
		53,1%		idem	idem	€ 0,00	idem	idem	idem	€ 8.940	Extenal	€ 19.013	€ 10.788

LONG-RUN RENT IN BOLOGNA MUNICIPAL AREA

Apartment location appart.	Monthly rent	Months	Gross revenue	waste tax	income tax	Portal fees	Utilities	Ordinary condo.- expenses	City tourism-tax	Management company fees	total differential costs by type of management		DIFFERENTIAL NET
"not specified"	€ 750	12	€ 9.000	€ 0,00	€ 1.890	€ 0,00	€ 0,00	€ 200	€ 0,00	€ 0,00	flat tax	€ 2.090	€ 6.910
				idem	€ 3.420	idem	idem	idem	idem	idem	non flat	€ 3.620	
Central Bologna	€ 1.050	12	€ 12.600	€ 0,00	€ 2.646	€ 0,00	€ 0,00	€ 200	€ 0,00	€ 0,00	flat tax	€ 2.846	€ 9.754
				idem	€ 4.788	idem	idem	idem	idem	idem	non flat	€ 4.988	

Unioncamere ER on AirDNA data, Tecnocasa Data and direct observatios (flat tax on rents applied)

Figure 7: Simulation of comparison of DIFFERENTIAL yield between short-term and long-term rent. Municipality of Bologna.
Source: Author's elaborations on data provided by AirDNA, by "Il Sole 24 Ore" and direct observations.

From the direct observations on the major internet-sites active in the rental of real-estates in Bologna, emerged an average monthly price for the long-term lease of an apartment of about 75-80 square meters with 2 bedrooms of, on average, 750 euros per month, that is, 9,000 euros a year. Subtracted the differential management that affect the property it is possible to get to a net differential of just over 6,900 euros per year. This is a lower figure, but all in all, not unlike the one calculated in the case of short-term rent with direct management by the property but significantly higher than the one which would be obtained in the case of a short lease with totally external management.

If the apartment instead of being placed in an imaginary "average area" of the city of Bologna is located inside the (former) walls of the city that separate historical centre from the rest of the city, the rent of the same, always in the form of long-term rent, would rise to around 1,050 euros per month. Under the same circumstances, the short-term leasing on Airbnb could result in a net differential of over 18,200 euros (over 8,400 euros more than long-term rent) in case of completely internal management of the accommodations rented on the portals. The net differential would become more than 10,700 euros in the case totally external management of the short-term lease (over 1,000 euros more than long-term leasing). In both cases, the differential yield would be higher than the one guaranteed by long-term lease.

The example highlights how, for those who own real estate in the city centre, *the economic premium for moving to a short-term rental management is considerable and, probably, growing* along with the effectiveness of the portal in *securing the lease payment*. This award is strictly localized in central-city and is of substantial entity. This explains why the phenomenon of displacement is as well located within the (former)

city-walls. It is therefore not surprising that most of the accommodations on Airbnb are located in central areas of Bologna.

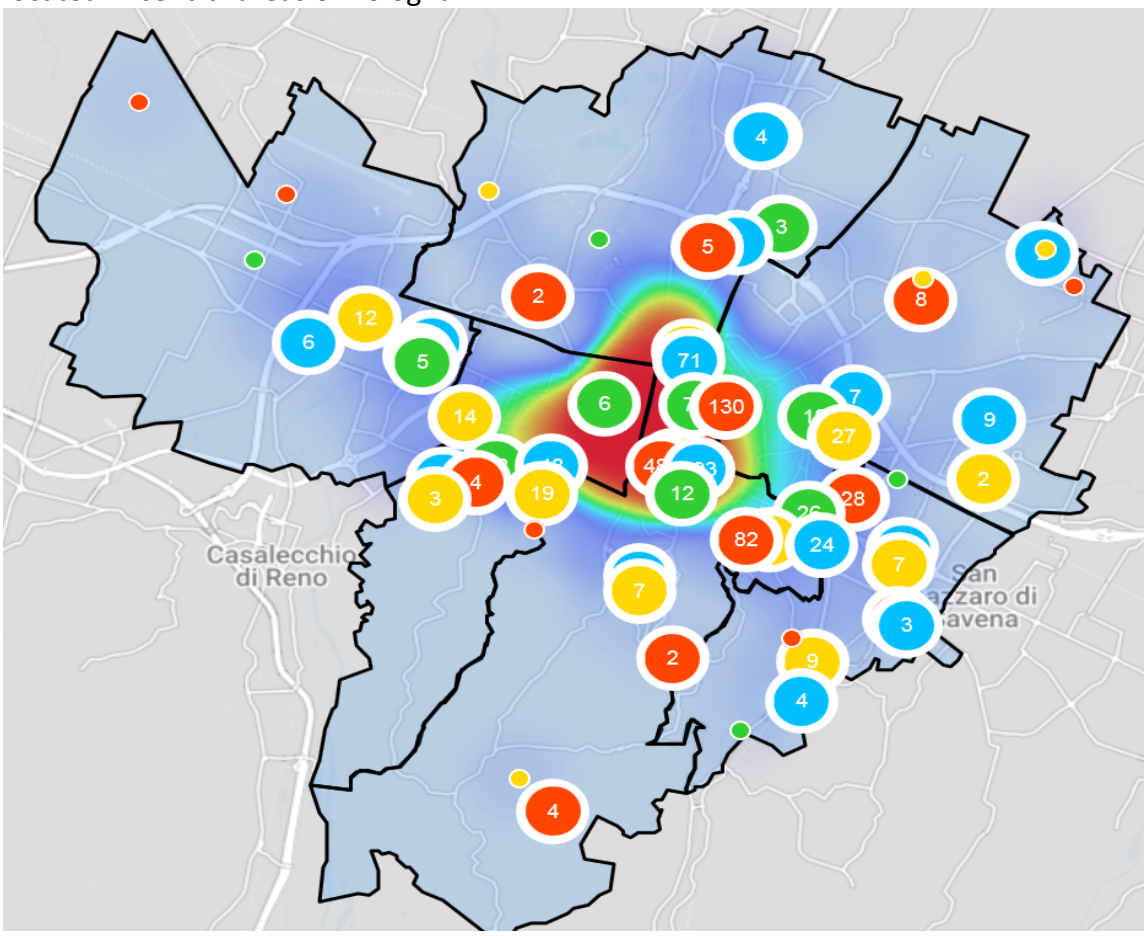

Figure 8: Spatial positioning of the accommodations offered on AIRBNB in the municipality of Bologna

Source: Monitoring of Airbnb, November. 2017. Municipality of Bologna's Open data: http://dati.comune.bologna.it/node/3088 The coloring of the map is as warmer as the concentration of facilities on Airbnb is higher.

In addition to the differences in the amount of earnings granted, another element that owners take into consideration in choosing between short-term and long-term leases is certainly *the risk of delay/lack of payment*. While with a short-term lease this risk is almost unknown (the prior authorization on credit cards makes it dissolve), with a long-term lease the risk is high (given the ultra-annual commitment of the parties and costs and timing of the eviction procedure, not to talk about the fact that – in Italy – home-owner should pay taxes on rents even if the lessee doesn't actually pay for it).

All these elements are particularly critical for those groups that are already struggling to find apartments for rent, especially in large cities. The immediate reference is to large, low-income families and out-of-town students. The increase of rents in cities with the highest housing tension has already been registered abroad.

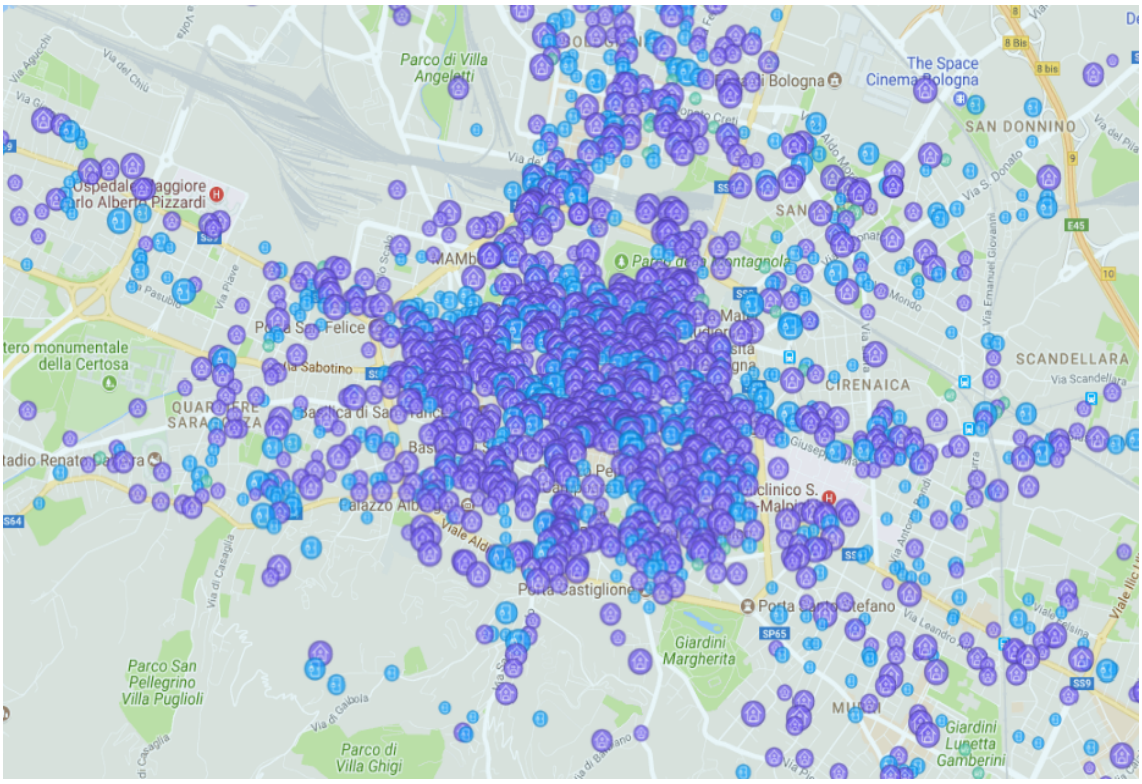

Figure 9: Spatial positioning of the accommodations offered on AIRBNB in the most central area of the municipality of Bologna
Source: AirDNA, Market overview

12. Airbnb in Bologna metro area: are there monopolistic tendencies?

Considering the relationship between rentable and rented facilities on Airbnb for Bologna metropolitan area on a monthly basis, the effectiveness of Airbnb in granting business for its hosts is constantly increasing. As shown in the chart reported, the minimum value of the ratio between the two quantities, reached during lower-seasons for urban tourism, is constantly increasing year-by-year.

Platforms that work as market-places, like any other organized market in which goods and services are exchanged, are *all the more effective* in ensuring the success of transactions, *the greater is their density* (that is, the greater the presence of operators on the market-place itself) and, at the same time, they are all the more dense the more effective they are, since the operators will try to be on markets that guarantee the greatest chances for transaction success. It follows that, after a first phase in which more than one market or, as in our case, multiple platforms coexist at the same time, another one follows in which operators tend to transfer their transactions more and more towards the most effective market, *thus making it even more potentially effective*. The process goes on *until the market is saturated*, that is, as long as there is no more room to accommodate more operators, or *until the cost that operators have to bear to reach and use that market does not exceed the potentials advantages of marketing there*.

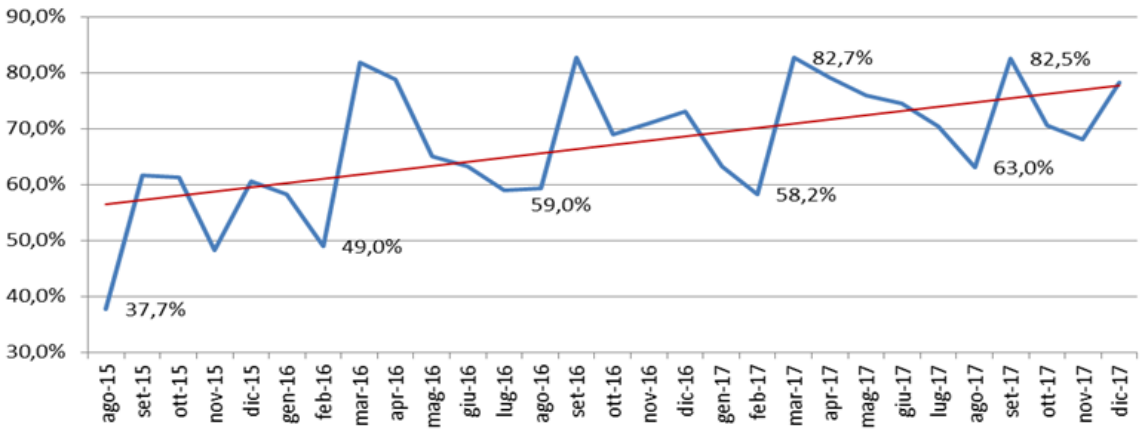

Figure 8: Reserved facilities and those advertised every month on Airbnb portal. Metropolitan area of Bologna.2015-2017.
Source: Author's elaboration on data provided by AirDNA.

In the case of an on-line platform, *saturation is almost impossible*. Indeed, since the transactions are carried out only in an automated manner, investing in calculation power and memory capacity is enough to prevent the risk of saturation. The virtual nature of the marketplace, moreover, *makes the cost of reaching the market almost nil* and, in any case, *absolutely independent from the physical distance between the operators and between them and the platform-market operator*. As regards to the *entry and use costs* charged to hosts by the platform, usually they are proportional to the actual turnover, so they are never such as to cancel the marginal gain of entry into the platform. By projecting these trends into the future, *the risk of creating monopolies is actual* and this could *jeopardize competition* and, therefore, consumers' well-being, both in terms of prices and in terms of technological innovation.

13. Final remarks and conclusions

The sharing-economy is based on the *exchange* of goods and services with other goods and services or a (limited) amount of money. Sharing-economy has landed on tourism to follow the *needs of savings* of travellers but is also consolidating as a chance to live a *more authentic experience* in the visited locations, an experience less mediated by professional operators. In many cases the spirit of liberality among peers is maintained in transactions while in other cases it is transforming into a proper business that integrates many of the requirements, also from the legal point of view, of *entrepreneurial professionalism*.

Apart from this problem, of no small account, another one remains. The historical centres of many towns and cities suffer from the "*displacement of the habitual inhabitants*" in favour of the tourists accommodated in facilities in short-lease which offer to the owners yields not comparable to those granted by the traditional, long-

term rent. This phenomenon has already reached considerable intensity in many cities around the world and is also growing in Bologna.

On the other hand, it is true that these platforms allow, especially in *economically marginal but culturally and scenically interesting areas*, forms of income integration that allow to take care of properties that otherwise would not be profitable, enabling residents to stay on site. It should not be neglect the fact that, where the underlined characteristics of exchange between peers remain, the dimension of "*experiential-tourism*" for guests and owners is a source of reciprocal cultural enrichment. Another aspect not to be overlooked is the fact that *big groups and families*, with limited budgets, could not travel without the saving opportunities offered by the sharing-economy.

The analysis of data related to the different types of accommodation available on Airbnb for the metropolitan area of Bologna has made evident the coexistence of these very different phenomena within the accommodation portal analysed.

Alongside properly sharing and peer-to-peer solutions such as beds in shared rooms and private rooms in shared apartments (which account for 20% of Airbnb turnover for Bologna), there are solutions more typical of the traditional economy as apartments professionally managed by specialized agencies and permanently available for rent on the portal. These *not-so-sharing* solutions have to be found among those that make up 80% Airbnb turnover, the "entire places". Among "entire places", the "hotel comparable" accommodations have to be spot-lighted because they are in a relation of proper direct competition with hotel accommodations. They represent 44% of total Airbnb revenue while the remaining 36% can be considered an estimate of the additional tourism flows generated by Airbnb for Bologna as tourist destination.

It is, thus, true that - on the one hand - the Airbnb phenomenon has an area of overlap - and therefore competition - with the (hotel) industry of accommodation. It's however equally true, on the other hand, that it has activated tourist flows that were previously only potential. The carrying out of this study has allowed to size, with a certain degree of approximation, these aspects for the Metropolitan area of Bologna.

The paper also tried to illustrate the different consequences of the spread of tourist *sharing in urban and extra-urban frames*, highlighting the risk of displacement of habitual dwellers from tourist areas as well as the permanent destination of historical areas to the service of mass-over-tourism with obvious angry reactions.

Net of this, the phenomenon of the sharing economy in tourism has a remarkable scope that has only begun to show its potential and its effects on the world of tourism. It is reasonable to expect that there will be no trend reversals in the foreseeable future, that is, the sharing-economy - in tourism as in other sectors - has arrived to stay and must, therefore, be managed.

A unique solution to avoid distortions has not yet been found but this is not a good reason not to insist. Radical technological innovations that take the form of radical economic and social innovations require adequate measures to protect the society

from the externalities they produce because they produce externalities even to the detriment of themselves.

It is not easy. It is necessary.

14. Empirical data-checking

In order to verify the consistency between the data provided by AirDNA regarding the Airbnb portal and the reality resulting from the material consultation of the Portal, the offices of Unioncamere Emilia-Romagna during the second week of February 2018 performed an empirical verification on all the facilities available on the Portal for the Metropolitan area of Bologna. In the week indicated almost 1,000 facilities were listed, equivalent to more than 1,600 rooms for a maximum capacity of more than 3,400 guests.

The annual average, for 2017, of the monthly facilities available for the reservation is over 3,600. Can data that have been detected directly be considered consistent with those provided by AirDNA and analysed in the previous pages?

To answer the question, it is necessary to consider the conceptual differences existing between the quantities taken into consideration. First of all, the range of time considered falls in low season for tourism in Bologna. The value for 2017 of the facilities available for the reservation for the month of February is 2,885, a value closer to that found directly compared to the annual average. Secondly, it is necessary to keep in mind that while the values provided by AirDNA are monthly data, those recorded by Unioncamere Emilia-Romagna's offices are related to a specific week, this means that the facilities that were available for reservation only in one of the other weeks of the month have not been counted. In third and last place, having monitored the accommodations bookable for a given week, the accommodations already booked were not displayed.

All the above considerations been made, it's possible to conclude that the data relating to the bookable facilities collected directly from Unioncamere Emilia-Romagna's offices and those provided by AirDNA are compatible with each other.

As far as the average tariffs are concerned, the only comparison that can be made directly is the one for entire apartments. The average price noted for these facilities by the offices (including cleaning costs) is equal, for the week indicated, to 101.77 euros per night. From the data provided by AirDNA it is obtained that the average annual tariff of 2017 for "entire places" is equal to 91.10 euros. Even in this case, however, the comparison must be made with the data relative to the month of February which is 72.20 euros.

Therefore, we have that the average rate deriving from the direct observations is equal to 101.77 euros while the one that is derived from the AirDNA is equal to 72.20 euros. Are these two values compatible?

Also in this case, it is necessary to analyze the conceptual differences that are behind the two figures in comparison. While the data provided by AirDNA lead to the calculation of the average tariff applied by the actually leased facilities, the data collected by the offices lead to the calculation of the average fare required by advertised accommodations on the portal in the week indicated and not yet booked. It is reasonable to expect that, *ceteris paribus*, a lower price is preferred during the actual booking phase. It follows that it is reasonable to expect an average price charged lower than the average price required by the facilities. Such difference, then, in a low season period characterized by a weak demand, should also be consistently big.
In the light of these considerations, it is certainly possible to conclude that the data relating to tariffs collected directly from the offices and those provided by AirDNA are compatible with each other.

15. Methodical Appendix

15.1 Comparing room-nights

Each hotel room, unlike rooms managed through the portals, is available for booking 365 nights a year (Bologna metro area has almost 100% hotels open all-year-long), thus generating a number of annual room-nights much greater than those generated by a corresponding room managed by sharing-economy portals. This means that a direct comparison between the 5,408 rooms available at least for one night by Airbnb in 2016 and the 14,016 rooms related to hotels during the same year would lead to terribly misleading conclusions.

It is necessary to insert two elements into the comparison, one to measure the different availability of rooms in terms of rentable room-nights per year, the other to measure the actual occupation of these rooms, that is, a measure of actually rented room-nights. It is, therefore, necessary to estimate, first, the theoretical maximum number of room-nights in one year multiplying the number of rooms available for the average number of nights of availability for the lease. Once this is done, it is necessary to apply to this estimate the occupancy rate of that type of facilities.

As far as hotel facilities are concerned, the average number of rentable nights in one year is 365 (in the Metropolitan area of Bologna, the seasonal hotel facilities have a very, very little weight, but the exact percentage is not available). Multiplying this number by the average rate of occupancy of hotel rooms for Bologna (prudentially estimated at 60%[14]) it is possible to get an estimate of the room-nights booked in the hotels. The estimate, for the Metropolitan area of Bologna, is above 3 million units.
To estimate the number of room-nights booked through Airbnb in the same year, it is possible to follow the general procedure just outlined or the one made possible by data available in this specific case. In more details, the number of nights for which the facilities of different types (one room, two rooms, etc.) were actually booked in the year 2016 is available. It is therefore sufficient to multiply this value by the number of rooms owned by the different types of facilities obtaining, thus, an estimate of the

nights-room booked in one year through the portal. This estimate is prudential because one type of rooms is defined as open (4 or more rooms).

15.2 Airbnb room-nights and Hotel ones. Simulations of 2018 data

Given that data for hotel rooms (through Istat) and Airbnb ones (thought AirDNA) are available only for the years 2015 – 2017, an estimate had been made to project the incidence of Airbnb on hotel industry on 2018. This estimate has used the prudential occupation yearly rate specified in previous paragraph (60%), the number of hotel rooms of 2017 (13.146) and has applied to the number of room-nights on "hotel comparable" facilities booked via Airbnb in 2017 (173.584) the same growth registered during 2017 (+64.2%). The incidence attained is one room-night for Airbnb every 3.4 nights in hotels. Even applying to the growth of room-nights in "hotel comparable" facilities the decrease in the speed of growth registered comparing 2016 to 2017 and to the number of hotel rooms in hotel the same variation registered during 2017, the incidence attained would be 4.2. These two figures are the two extremes of the evaluation range for the indicator under analysis for 2018.In this paper, the first extreme was used.

15.3 AirDNA data methodology

AirDNA data are based on Airbnb data gathered from information publicly available on the Airbnb website and is the only "trusted" (by hosts themselves) source for short-term rental data that provides occupancy rates and revenue data.

About the recognition of booking vs. blocking listings

AirDNA has developed advanced artificial intelligence and machine learning technology that allows accurate identification of blocks of unavailable dates observed on Airbnb's platform as either booked by a customer or blocked by the host. This ability to discern between booked and blocked nights is core to any analysis of Airbnb data.

AirDNA utilizes statistical pattern-recognition techniques, which define a mathematical relationship between what is known about a property and actual classification of genuine reservations or dates blocked by the host. These are similar in concept to the algorithms that enable Amazon to recommend new products that you might be interested in Netflix to recommend new movies and OkCupid to recommend potential partners.

The accuracy of AirDNA's prediction model is tested by setting aside a portion of AirDNA's known booked/blocked historical data, hiding it from the model training data and then asking the system to classify the blocks of unavailable dates once it's been trained. This output is then compared against the actual known booked/blocked status of each grouping of days to assess the degree of predictive accuracy.

True to its machine learning classification, AirDNA's artificial intelligence model continues to learn and improve as time goes on. This is important as Airbnb booking trends are likely to continuously evolve over time as evidenced by past behaviour. AirDNA's AI continues to observe behaviour, extract patterns from new information and historical knowledge and, as a result, predict Airbnb booking information with accuracy.

About the listing revenue calculation

AirDNA reviews constantly the calendar information of Airbnb properties to determine when a place was booked and for how long. When a new reservation is recorded, the advertised daily rate of each of those days directly before the booking occurred is calculated. Then, the cleaning fee for each unique reservation is added in. At the end of the month AirDNA sums up how many days have been booked and at what rate and calculate monthly revenue.

Fees for additional guests or last-minute discount are not visible so they have not been considered.

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[10] Estimated by multiplying the overall number of booked facility-nights for the number of rooms of each facility. To get more information about the procedure followed for the calculation please see the Methodical Appendix (paragraph 15) at the end of this paper.

[11] This figure derives from the official number of hotel rooms available for Bologna metro area (14.016 for the year 2016) provided by Istat (the Italian National Statistical institute) and the occupancy rate (66%) calculated in Italian Hotel Monitor by Trade Mark Italia (a consultancy operating in tourism sector)

for Bologna. The occupancy rate used for calculation has been revised downwards for prudential reasons (to 60%) since the sample used by Trade Mark Italia incorporates few hotels outside the Bologna urban area. The hotel rooms in 2017 were 13.146 and occupancy rate used was the same (60%). To get more information about the procedure followed for the calculation, please see the Methodical Appendix (paragraph 15) at the end of this paper.

[12] The procedure of calculation has been clarified in a previous note.

[13] In the first case, the costs of the portal and not the management costs should be considered as costs. The opposite is necessary in case of external management. In both cases, however, income taxes must be considered since, being proportional to the same income, they have a different value in the various simulations. For the determination of income taxes it has been assumed that the flat-rate income tax can be applied so as to be able to disregard the taxable income of the owner that would determine the marginal rate applicable to the lease fee, making arbitrary the comparison.

[14] The average occupancy rate for hotels in Bologna, according to the Italian Hotel Monitor by TradeMark Italia (a tourism consultancy) was, 66% for the first ten month of 2016. This value was reduced to 60.0% to compensate for the smaller representativeness of the IHM sample in remote parts of the Metropolitan area of Bologna and to be prudential about the last two months of the year that are low season for Bologna tourism).