Spatial penetration of Airbnb, rent-gap and gentrification: A comparative study of Barcelona and Lisbon.

Nachatter S. Garha

Abstract

In the last decade, due to its relationship with gentrification, Airbnb and other short-term rental services have attracted urban researchers, economists, politicians and civil activists. With a very small investment, these services allow the transformation of residential apartments located in specific areas (such as business centres or main tourist attractions) into short-term rentals, which are then rented at a relatively higher price than the average monthly rent in the neighbourhood. It creates a rent-gap that eventually exclude long-term residents and gentrifies neighbourhoods. Using data extracted from the Airbnb website, census records, socio-economic surveys and open sources, this article 1) identifies areas with high Airbnb penetration in Barcelona and Lisbon, and analyses (with multiple linear regression models) the spatial, structural, demographic and cultural factors that facilitates it; 2) measures the amount of long-term rental houses lost to Airbnb and the rate of evacuations in the areas with high concentration of listings that lead to the Airbnb-induced gentrification of some specific neighbourhoods in both cities. Preliminary results show that Airbnb has penetrated more into residential areas in the city center and around tourist attraction, with a young, more educated and ethnically diverse population. It has created a rent-gap that contributes to the increasing number of evictions and intensifies the gentrification process in several neighbourhoods in both cities.
Keywords: Airbnb, spatial penetration, gentrification, short-term rentals, rent-gap.

Introduction

During the last decade, access to affordable housing has become a major concern in many European cities. The situation is even worse for young adults, who want to leave their parent's home but due to precarious working conditions, they do not have enough income to pay house-rents, and for the immigrants, who lack social and economic capital in their new place of residence. Rapid urbanisation has increased the demand for housing in cities, but limited space restricts the possibility of new construction and the regular supply of houses to a growing population. The recent surge in tourism and the emergence of the short-term rentals (sharing economy) has exacerbated the housing crisis in several tourist cities, such as Barcelona and Lisbon. By reducing the number of housing units available

for long-term rental and by increasing the rents of available units, these services exclude the native population from their traditional neighbourhoods and allows gentrification. One of the main global players in the short-term rental business, which has a very strong presence in Barcelona and Lisbon, is the 'Airbnb'.

Airbnb is a hospitality service that allows people to rent their unused rooms or entire apartments through computer-mediated transactions. It originated in 2008 in the United States and since then it has expanded to 100,000 cities in 191 countries and regions worldwide (Airbnb 2019). According to October 2019 data, it has more than 7 million listings worldwide and on average over 2 million people staying on Airbnb per night (Ibid). It is not the only short-term rental service in market, but it is certainly the largest service that has approximately twice as many listings as its nearby competitors (HomeAway, houset etc.). It generates more annual revenue (around $38 billion) than the most famous hotel chains, such as Hilton and Marriot international (Molla 2019). The company's mission, as described by the company itself, is "to create a world where people can belong through healthy travel that is local, authentic, diverse, inclusive and sustainable. Airbnb uniquely leverages technology to economically empower millions of people around the world to unlock and monetize their spaces, passions and talents and become hospitality entrepreneurs." (Airbnb 2019). It presents a very positive image of the company, which acts as a bridge that connects people around the world and allows them to share their houses and neighbourhoods. But for many researchers, politicians, community groups and housing activists around the world, it has a devastating effect on affordable housing in the traditional working-class neighbourhoods of major tourist cities, which intensifies the gentrification process (racial and socioeconomic) (Wachsmuth et al. 2017, Wieditz 2017, Lee 2016, Samaan 2015). By creating a rent-gap, it also increases evictions of long-term tenants and excludes the middle-class native population from their native neighbourhoods. Moreover, Airbnb's business model has remained controversial since its inception, as it ignores the rules and regulations of housing and land use in almost every city in which it operates (Wachsmuth and Weisler, 2018).

While studying the impact of Airbnb on housing, researchers have pointed out that it has created 'a new category of rental housing—short-term rentals—which occupies a lacuna between traditional residential rental housing and hotel accommodation' (Wachsmuth and Weisler, 2018). Proponents of Airbnb and other short-term rental services claim that these services have made it easier and more lucrative for smallholders to rent their spare rooms, which supplements their monthly income and brings tourism to

neighbourhoods where tourists traditionally do not visit. According to them, it empowers people to exploit the full potentials of their properties and generates additional income for businesses in these neighbourhoods. But critics claim that these services take away already scares long-term rental housing units in cities, increase rents for remaining long-term rentals, transform the residential buildings into commercial assets, generate precarious jobs in the service sector, decrease the quality of life of local residents and exclude the native population from their traditional neighbourhoods (Samaan 2015, Cócola Gant 2016). As Airbnb listings are not distributed equally in different neighbourhoods of cities, it also creates spatial inequalities and congestion problems in tourist areas of cities that are already overcrowded (Quattrone 2016).

In this paper, I will analyse the impact of Airbnb on two major tourist cities in southern Europe, Barcelona and Lisbon. In 2017, Barcelona was the fourth most visited city in Europe with 12.1 million visitors and in the same year Lisbon received around 4.5 million visitors (Traveltrivia 2018). Despite the large number of visitors in Barcelona, Lisbon receives more visitors per local resident than Barcelona. This large influx of visitors, coupled with the eruption of short-term rental services, has a huge impact on the availability and affordability of houses in both cities. Barcelona was one of the first cities in Europe where Airbnb started its business in 2009. In subsequent years, the number of listings increased rapidly and reached to 14,012 in 2015. Along with the economic crisis of 2008, Airbnb played a significant role in increasing the evacuations of long-term tenants and hindered access to affordable housing for poor middle-class working population, which prepared the ground for the housing movement *Plataforma de Afectado por Hipoteca (PAH)* in Barcelona. To curb the expansion of short-term rental services, in 2015 the municipal government under the leftist mayor Ada Colau banned the issuance of new licenses for short term-rentals and began to fine house-owners, who rented their properties illegally. It has put some breaks on the expansion of Airbnb in Barcelona, but has a limited impact on the increase in rents and the gentrification of some specific neighbourhoods of the city. In 2019, the number of active listings was 20,404, which shows that people are still renting their properties without legal permissions. On the other hand, Airbnb penetration in Lisbon began after 2010, but quickly expanded to all central neighbourhood of Lisbon. Unlike Barcelona, the unrestricted growth of Airbnb in Lisbon has exacerbated the already growing shortage of housing in many central neighbourhoods of the city. Airbnb has contributed to the conversion of residential properties into

commercial places, which are often brought by foreign investors to put in the short-term rentals business (Cocala-Gant and Gago 2019).

In previous research on the impact of Airbnb in Barcelona and Lisbon, several authors have discussed the impact of Airbnb on the tourism and hotel industry (Gutiérrez et al. 2017)), quality of life in the city (Cocala-Gant 2016, Cocala-Gant and Gago 2019) and the commercialisation of residential units (Iago et al 2019). But still the degree of Airbnb's penetration in different neighbourhoods and the factors that determine it, and its impact on the real estate market, evacuations and the gentrification process are not yet been studied. In this paper, I will answer these questions with empirical evidences.

Major Hypothesis

The working hypotheses of this paper are:

H1. Barcelona and Lisbon have registered an unequal penetration of Airbnb in different parts of the cities, which is an outcome of several spatial, structural, demographic and cultural factors that characterise the different neighbourhoods of both cities. It creates spatial inequalities in both cities.

H2. By increasing the potential rentier income without any need for redevelopment, the presence of Airbnb exacerbates the shortage of homes in Barcelona and Lisbon. It also facilitates the evacuation of long-term tenants and intensify the gentrification process in specific neighbourhoods of both cities.

Objectives

The main objective of this paper are:

1. Identify the areas with high Airbnb penetration in Barcelona and Lisbon and analyse (with multiple linear regression models) the spatial, structural, demographic and cultural factors that facilitates it.

2. Calculate the amount of long-term rental apartments lost to Airbnb and the rent-gap generated by it in each census track of Barcelona and Lisbon, and then measure the rate of evacuations of long-term users that lead to the Airbnb-induced gentrification of some specific neighbourhoods of both cities.

Airbnb, rent-gap and gentrification

The effect of Airbnb on the emergence of the rent-gap and thus gentrification, has received much attention from researchers in the last decade (Wachsmuth and Weisler,

2018, Stulberg 2016). As Airbnb functions as a mechanism to produce new revenue streams for the house-owner, it also increases the average house-rent and creates a rent-gap in the areas where it operates. Niel Smith (1979), in his study of American cities (New York City and Philadelphia), first proposed the "rent-gap" model to offer a structural explanation for gentrification. At the core of this model, when actual economic returns on properties decrease or stagnate and potential economic returns begin to increase, it encourages real estate investors to direct new investment flows in housing. Due to the new flows, housing prices goes up, which excludes the poor middle class working population and attract more affluent newcomers, resulting in gentrification. In Smith's (1979: 545) own words:

> *"Gentrification occurs when the gap is wide enough that developers can purchase shells cheaply, can pay the builders' costs and profit for rehabilitation, can pay interest on mortgage and construction loans, and can then sell the end product for a sale price that leaves a satisfactory return to the developer". (Smith, 1979: 545)*

The scope of Airbnb as a potential gentrifier is immense, since it reduces the cost of redevelopment of housing units, which is considered a necessary prerequisite for gentrification. Often, the only step required to convert a long-term rental into a short-term rental is to evacuate the existing tenants. In that way, Airbnb allows gentrification without redevelopment. Wachsmuth and Weisler (2018) summarise the relationship between Airbnb, rent-gap and gentrification as:

> *"Airbnb and other facilitators of short-term rental housing are indeed systematically driving gentrification and displacement. Airbnb simultaneously opens and provides a means for closing new technology-driven rent gaps, but it does so by raising potential rentier income without any need for redevelopment, in a geographically uneven fashion, concentrating in neighbourhoods with extra local tourist appeal which do not necessarily overlap with areas gentrifying due to more traditional state or market factors." (Wachsmuth and Weisler, 2018: 7)*

The effect of Airbnb is also culturally mediated, as the rent gap increases first in those areas that are close to the city centre and the points of attraction. Some researchers have also highlighted the role of Airbnb in exacerbating the housing conditions of already gentrified areas, which are now experiencing "super-gentrification" (Lee 2003).

Data Sources

In this paper, I have used following data sources:

1. ***Airbnb web-scraping data:*** It consists of microdata files of all listings in Barcelona and Lisbon available on the Airbnb website in 2019. After data cleaning, the property files contain 20,404 listings for Barcelona and 18,246 listings for Lisbon. Each listing in the property file provides a large amount of information including:

   a) Host and Room Id: Unique identification number for each host and accommodation.

   b) Location of accommodation: Neighbourhood and neighbourhood groups

   c) Type of Room: Airbnb offers three types of rentals: 1) entire homes, where the guest has access to the entire unit and the host is generally not present, 2) private rooms, where the host is often present in the home, and 3) shared rooms, where hosts or others guests may sleep in the same room.

   d) Geographic location: latitude and longitude coordinates

   e) Details of the accommodation: number of bedrooms, bathrooms and maximum number of guests.

   f) Rental policies: cancellation policy and security deposit, cleaning fee, check-in and check-out times, etc.

   g) Price: nightly/weekly or monthly price

   h) Number of Reviews: Reviews given by users

   i) Other details: the URL of the listings, the number of photos in the listing, etc.

The data is downloaded directly from the website; therefore, it is supposed to be the most accurate source. In Barcelona and Lisbon, Airbnb is the largest home-sharing platform, but it is not the only player. Due to the lack of data from other services, I acknowledge that my results will be under estimates of the actual impact of short-term rentals on the real estate market and gentrification. But it will also prove that if only one company can produce this impact, then the joint impact of all companies will be stronger than the results I get from this study. The main limitations of the Airbnb data are: 1) The number of bookings is key to understanding the penetration of Airbnb and its effect on housing, but the web scrape does not provide information about bookings. Following previous studies, I have used the number of reviews for each listing as an indicator of the frequency of bookings (Quattrone, et. al 2016); 2) Airbnb obscure the exact location of short-term rentals on its website (up to 150

meters) for privacy reasons, so it is not possible to determine the exact locations of the apartments. But since I am using the listing data at the census track level, I assume it has a minimal impact on the spatial distribution of the listings.

2. ***Census records, municipal register and socio-economic surveys:*** To characterise different neighbourhoods of both cities, I collect data on various structural, demographic and cultural characteristics of the resident population and housing stock at the census track level.

Table 1. Different datasets used for this study.

Category	Acronym	Metric	Source	Description
Airbnb	abnb	Airbnb penetration	Airbnb Website	All listings registerd in a given city
Spatial	dist	Distance to center	Google maps	Distance from the center of a given spatial unit to the center of a city
	poi	Points of Interests	Trip Advisor	Number of points of interest in a spatial unit
	trans	Transport Access	Open street map	Number of bus and metro stops
Demographic	popden	Population density	Municipal Register	Population density in a given spatail unit
	young	Age Structure	Municipal Register	Proportion of people aged between 20 and 34 years
	native	Native population	Municipal Register	Proportion of residents born in a spatial unit
	popdiv	Population diversity	Municipal Register	Share of people from different regions
	sph	Household structure	Census	Proportion of single person household
Structural	unemployment	Unemployment ratio	Active population survey	Proportion of unemployed
	ahincome	Average household income		Proportion of low income households
	housecon	Condition of housing buildings	Census	Proportion of residential buildings constructed 25 years ago
	houserent	Average house rent	INCASOL/Census	Average house rent
	housesize	Size of Apartments	Census	Proportion of apartments below 60 square meters
	owner	Tenancy regime	Census	Proportion of owner occupied residences
Cultural	bohemian	Bohemian Index	Census	Proportion of population employed in art, entertainment and media business
	education	level of education	Census	Proportion of people with university education
	mig	International Migration	Municipal Register	Proportion of immigrants from low HDI countries

Source: Own elaboration.

3. ***Google API and trip-advisor:*** To study the distribution of 'points of attraction' (famous tourist spots, hotels, business centres, transport access points, museums, traditional bars and food markets), and the distance from the city center and points of attraction.

Methodology

1. ***Measurement of Airbnb's spatial penetration:*** To study Airbnb's spatial penetration in different areas of both cities, it is essential first to define a spatial analysis unit that covers entire area of Barcelona and Lisbon. Therefore, I choose the smallest spatial units: the census tracks, for which data is available in both cities. Barcelona and Lisbon have 1068 and 1054 census tracks, respectively. When necessary, the results are presented at the neighbourhood level, which makes more sense because all these neighbourhoods share historical and cultural attributes and have more or less similar problems. First, for the descriptive analysis, I made two indicators to measure the presence of Airbnb in different census tracks i.e. the total number of Airbnb listings per square kilometre and the total number of Airbnb listing per population size of each census track.

    To study the impact of several independent variables, mentioned above, on the spatial penetration of Airbnb, I have used multiple linear regression model:

    $$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_k x_{ki} + \varepsilon_i$$

    Where, y_i is the number of listings in a census track and the $x_i...x_k$ are the independent variables, which reflects the spatial, structural, demographic and cultural (Table 1), conditions of census track *i*. Since most of my metrics are correlated with each other, I have used Variance Inflation Factors (VIF) technique to tackle the issue of "multicollinearity". The VIF associated with an explanatory variable is obtained by, first, performing the linear regression with the explanatory variables as a dependent variable and the other remaining variables as independent ones and, second, by using the overall model fit (i.e., the R2 value) obtained in the previous step in the following formula:

    $$VIF = \frac{1}{1 - R^2}$$

In addition, to compare the influence of each independent variable in different models and to avoid the effect of different scales of my metrics, I standardize them by computing their z-scores.

$$Z_i = \frac{x_i - \mu}{\sqrt{\dfrac{\sum(x_i - \mu)^2}{(n-1)}}}$$

Where, x_i is the value of variable in a spatial unit I, and μ represents the mean values of the variable in all spatial units. As I am dealing with geographic data, I tested for the presence of spatial autocorrelation for each model. In spatial models, it is widely accepted that the measurements located close to each other are more correlated. I test my models for spatial auto-correlation by computing the Moran's test on the residuals ε_i.

$$I = \frac{N}{\sum_i \sum_j W_{ij}} \; x \; \frac{\sum_i \sum_j W_{ij} \, (y_i - \bar{y})(y_j - \bar{y})}{\sum_i (y_i - \bar{y})}$$

Where, N is the number of spatial units and y_i is the value of the variable in spatial unit i. W_{ij} is a weight matrix for spatial units i and j.

2. ***Measuring the impact of Airbnb on housing:*** In Airbnb listings, no distinctions have been made between different hosts. For the purpose of this paper, I have defined two categories of hosts: 'commercial hosts', who rent their entire apartments for more than 60 days and private (or shared) rooms for more than 90 days, and 'casual hosts', who rent their apartments and spare rooms for short durations. In the previous research, it is widely accepted that commercial short-term rentals have a more negative impact over housing than the casual short-term rentals (Wachsmuth and Weisler, 2018). Therefore, to study the impact of Airbnb in different neighbourhoods I have focused on the commercial short-term hosts. I have made two indicators:

a) The proportion of housing units lost (HUL) to Airbnb: To calculate the number of HUL in different spatial units, I have used following formulas:

$$HUL_t^i = \frac{Commercial\_listings_i}{Total\_apartments_i}$$

$$HUL_r^i = \frac{Commercial\_listings_i}{Rent\_apartments_i}$$

Where, *Commercial_listings* represent the number of commercial apartments available in spatial unit *i,* and the *Total_apartments* represents the total number of housing units and the *Rent_apartments* represents the number of apartment available for rent in spatial unit *i.*

b) Rent gap (RG): The theoretical core of the rent-gap model establishes that where the potential ground rent sufficiently exceeds actual (or capitalized) ground rent, redevelopment and hence gentrification will tend to occur (Wachsmuth and Weisler 2018). To calculate the rent-gap generated by Airbnb, I compared the annual income from property-rent earned by commercial Airbnb hosts and the long term renters in all census tracks. I have also calculated the potential rent-gap threshold for each census track after which the landlords/house-owners began to evacuate their apartments from existing tenants to put them into short-term rentals.

Preliminary results

Spatial penetration of Airbnb in Barcelona and Lisbon

Airbnb's spatial penetration is extremely skewed in favour of some specific neighbourhoods in Barcelona and Lisbon (Figure 1). In both cities, most of the listings are concentrated in census tracks close to the central business districts and traditional middle-class neighbourhoods with strong cultural prestige, good public transportation, and leisure amenities along with the beaches. In Barcelona, the central district[1] of *Eixample*, which consists of *Sagrada Familia*, *Ensanche* and *Sant Antoni* neighbourhoods, has the highest number of listings, i.e. 6,753 (33.2% of the total) in 2019. It has also recorded the highest proportion of commercial listings (70.1%), compared to overall average (66.2%) and all other districts of Barcelona (Figure 2). After *Eixample*, *Ciutat-Vella* district, which consists of *El Raval, Bari Gotic, la Ribera* and *Barceloneta* neighbourhoods, has the second largest penetration of Airbnb in Barcelona. It has recorded 4,842 listings, representing 23.8% of the total listings in Barcelona in 2019. The districts of *Nou Barris (1.2%), Sant Andreu (1.8%), Les Corts (2.1%)* and *Horta Guinardo,* registered the lowest number of listings in Barcelona. It is worth mentioning that all these districts, accept Sant Andreu, are declared as the most vulnerable districts

---

[1] The municipality of Barcelona is divided into 10 district and these districts are further divided into 73 neighbourhoods and 1061 census section tracks.
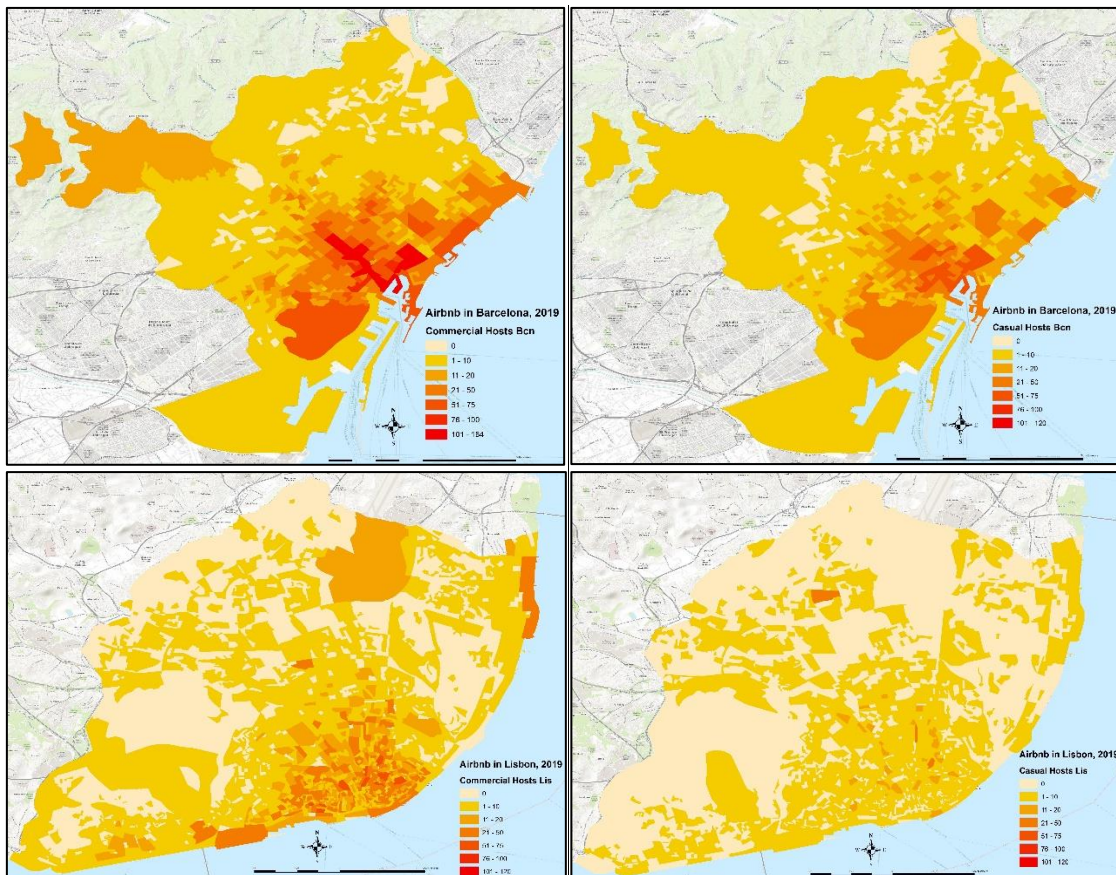
of Barcelona and the municipal government is working on a special plan to develop these neighbourhoods.

Figure 1. The spatial distribution of all listings of Airbnb in Spain and Lisbon.
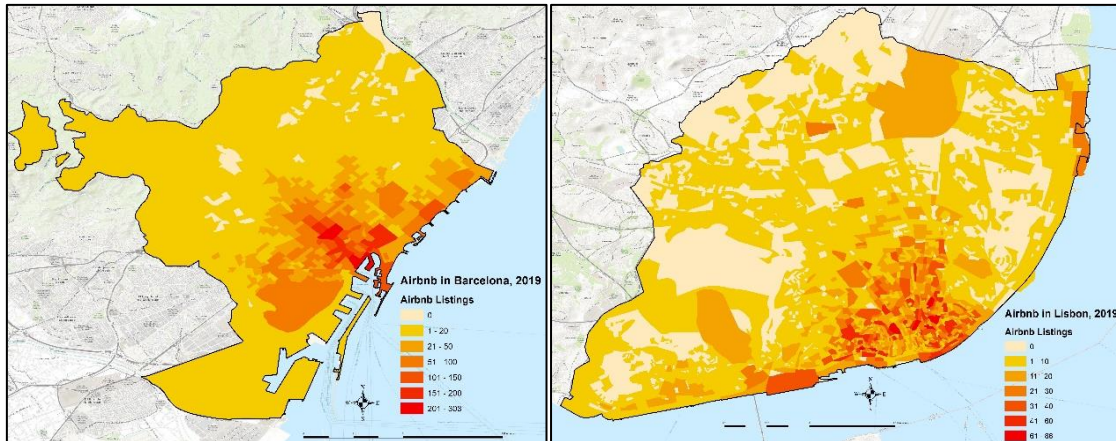
Source: Own elaboration, Airbnb web-scrapping, 20 October 2019.

Figure 2. The spatial distribution of casual and commercial Airbnb hosts in Barcelona and Lisbon, 2019.

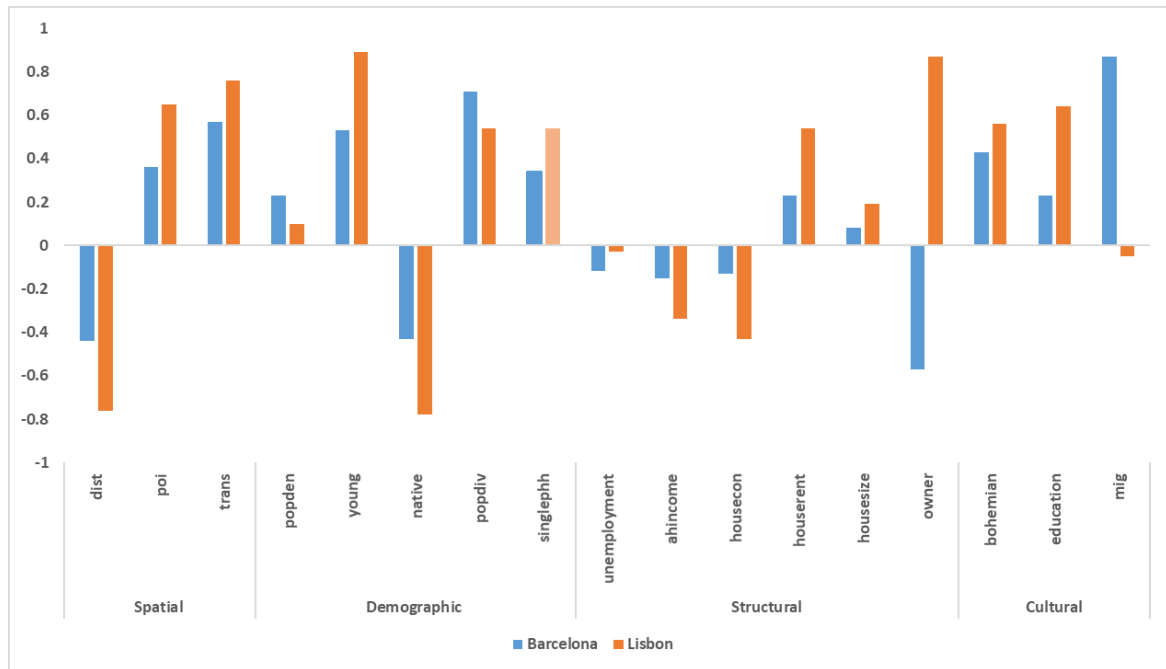*Source: Own elaboration, Airbnb web-scrapping, 20 October 2019.*

In Lisbon, in 2019, the maximum number of listings (1061) is registered in the parish of S. Jose, in which more than 70% are made by commercial hosts. After S. Jose, Santa Caterina (853), Encarnação (836), S. Sebastião da Pedreira (797) and Anjos (793) also registered high number of listings, with extremely high proportion of commercial hosts (around 85%). All these neighbourhoods surround the old historical part of the city, which attracts millions of tourists every year. On the contrary, the parishes of Charcena (7), Ameixoeira (14), S. João (25), Carnide (58) and S. João de Deus (66) have registered the lowest number of listings. Accept S. João de deus, all other parishes with a low number of listings are located on the periphery of the municipality of Lisbon, which shows that the distance from the city center has a negative impact on the penetration of Airbnb.

The coefficients of regression model (Figure 3) show that in spatial factors, the distance from the central business district and historical centres, have a negative impact on the penetration of Airbnb, but the presence of 'points of attraction' and good public transport facilitates the penetration of Airbnb into different parts of both cities. The effect of distance is stronger in Lisbon than in Barcelona. On the contrary, the points of interest and the transport has more impact in Barcelona compared to Lisbon. In demographic factors, the population density of each census track has a positive impact on the Airbnb penetration in both cities, but the impact is statistically insignificant in Barcelona. The proportion of young population in a census track has a positive impact, but that of native population has a negative impact on the number of Airbnb listings. The population diversity in the census tracks has a positive impact in both cities, but the effect is stronger in Barcelona, which justifies high Airbnb penetration in areas with high proportion of immigrant population from different ethnic or national origins. The proportion of single person household also positively affects the penetration of Airbnb in residential areas, but the effect is insignificant in Lisbon.

In the structural factors, the high proportion of unemployed people, the low average household-income and the high proportion of houses built more than 25 years ago in a census track has a negative impact on the penetration of Airbnb in both cities, but the higher average house-rent and the size of apartments have a positive impact on the number of Airbnb listings. Lastly, cultural factors also have a very strong impact on the penetration of Airbnb in both cities. Residential areas with strong cultural prestige attract a large numbers tourists and creates demand for short-term rentals. The high proportion of bohemian population (people engaged in art, music and entertainment

business) and people with a university education have a positive impact on the penetration of Airbnb in both cities, but the impact is much stronger in Lisbon than in Barcelona. Finally, areas with high share of immigrant population from high human index countries has a strong positive impact in Barcelona and a slightly negative impact in Lisbon.

Figure 3. The coefficient of determinants of spatial penetration of Airbnb in Barcelona and Lisbon in 2019.

*Note: Significance level: 0.001 '***', 0.01 '**', 0.05 '*'. Adjusted R squared = 0. 76 (BCN), 0.78(LIS), Moran's I = 0.07 (BCN), 0.8 (LIS).*

Source: Own elaboration with data from Airbnb web-scraping, Census records, municipal registers and open sources

Airbnb, rent-gap and gentrification

Airbnb has a strong impact on the long-term rental market in the central neighbourhoods of both cities. Firstly, the penetration of Airbnb has reduced the availability of long-term rental units by 20 to 25 percent in the central districts of Ciutat Vella and Eixample in Barcelona, and up to 39 percent in the historical city center of Lisbon. This loss of housing units has increased the pressure on the long-term rental market, which manifested itself in the form of increase in monthly house-rents in both cities. It has been increased by 6.2% in the central districts of Barcelona and 5.7% in Lisbon, which encourages house-owner to evacuate their long-term rentals and intensify the gentrification process in the

traditional neighbourhoods in both cities. I am still working on other variables to analyse deeply the correlation between evictions and the Airbnb penetration in both cities.

Figure 4. Heat map showing the residential units lost to Airbnb in Barcelona and Lisbon in October, 2019.

a) Barcelona   b) Lisbon
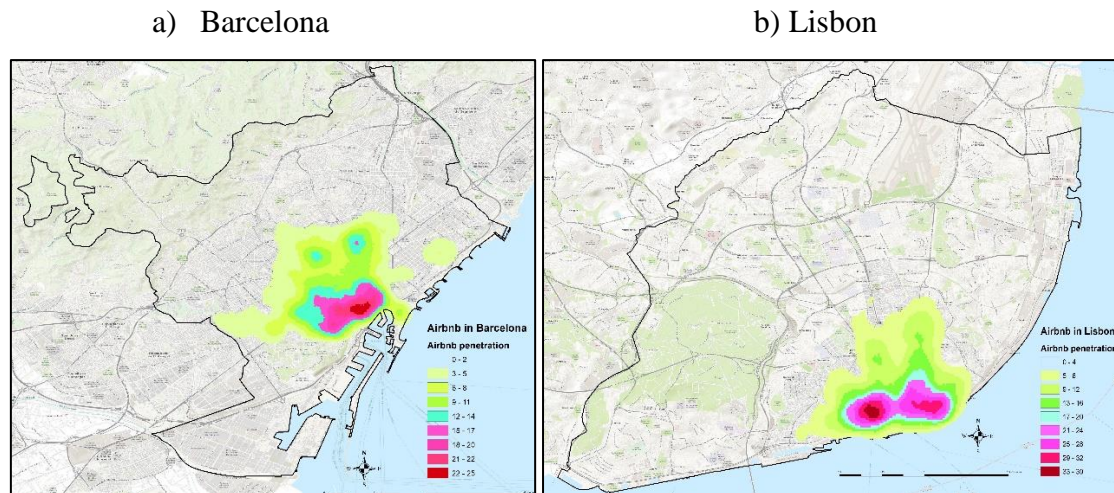
Source: Airbnb web-scrapping, 20 October 2019.

Concluding Remarks

1. Airbnb is more penetrated in the areas close to the city centre, business zones, tourist attractions and culturally rich neighbourhoods.

2. The availability of good public transport and high proportion of young population facilitates the penetration of Airbnb in both cities.

3. It is false to say that Airbnb brings tourism to neighbourhoods which traditionally do not receive tourism. In fact, Airbnb listings are more concentrated in areas which already overcrowded by tourists.

4. In contrary to what company claims, the benefits of Airbnb do not reach the marginalize and vulnerable neighbourhoods in both cities. By concentrating the benefits in the hands of some commercial hosts, it increases spatial inequality in both cities.

5. By unbalancing the local long term rental market, Airbnb has facilitated the expulsion of the native population and the gentrification of culturally rich traditional neighbourhoods in both cities.

References

Airbnb (2019). *"About Us." About Airbnb Website*

https://www.Airbnb.com/about/about-us. Accessed October 20, 2019.

Cócola Gant A (2016). "Holiday Rentals: The New Gentrification Battlefront." *Sociological Research Online*, 21(3): 10.

Cocala-Gant, Agustin and Gago, Ana (2019). "Airbnb, buy-to-let investment and tourism-driven displacement. A case study in Lisbon." *Environment and Planning A: Economy and Space*. Online August 2019, https://doi.org/10.1177/0308518X19869012.

Florida R. and Mellander. C. (2009). "There goes the metro: How and why bohemians, artists and gays affect regional housing values." *Journal of Economic Geography*, 1:22. https://pdfs.semanticscholar.org/4bff/4056af3bacc020ad4acac2c23bb4edc8a270.pdf

Gutiérrez, J., García-Palomares, J.C., Romanillos, G., Sales-Olmeda, M.H. (2017). "The eruption of Airbnb in tourist cities: Comparing spatial patterns of hotel and peer-to-peer accommodations in Barcelona." *Tourism Management*, 62, 278:291.

Hammel DJ (1999). "Gentrification and Land Rent: A Historical View of the Rent Gap in Minneapolis." *Urban Geography* 20: 116-45.

Iago Lestegás, João Seixas and Rubén-Camilo Lois-González (2019). "Commodifying Lisbon: A Study on the Spatial Concentration of Short-Term Rentals." *Social Sciences*, 8(33) 1:15.

Lees L (2003). Super-gentrification: The Case of Brooklyn Heights, New York City. Urban Studies 40 (12): 2487-2509.

Lee D (2016). "How Airbnb Short-Term Rentals Exacerbate Los Angeles's Affordable Housing Crisis: Analysis and Policy Recommendations." *Harvard Law & Policy Review* 10: 229-253.

Molla, Rani (2019). American consumers spent more on Airbnb than on Hilton last year, accessed on 21/10/2019. https://www.vox.com/2019/3/25/18276296/airbnb-hotels-hilton-marriott-us-spending

Quattrone, G., Proserpio, D., Quercia, D., Capra, L. and Musolesi, M. (2016). "Who Benefits from the "Sharing" Economy of Airbnb?" *International World Wide Web Conference Committee (IW3C2)*, April 11–15, 2016, Montréal, Québec, Canada.

Samaan R (2015) "Airbnb, Rising Rent, and the Housing Crisis in Los Angeles." *Policy report prepared for the Los Angeles Alliance for a New Economy*.

Smith N (1979). "Toward a Theory of Gentrification: A Back to the City Movement by Capital, not People." *Journal of the American Planning Association* 45 (4): 538-548.

Smith N (1996). *The New Urban Frontier: Gentrification and the Revanchist City*. New York and London: Routledge.

Traveltrivia (2018) Most Visited Cities in Europe. Accessed on 20 October 2019. https://www.traveltrivia.com/most-visited-cities-in-europe/

Wachsmuth, D and Weisler, A. (2018). "Airbnb and the Rent Gap: Gentrification Through the Sharing Economy." *Environment and Planning A: Economy and Space*, 50(6), 1147-1170.

Wachsmuth D, Kerrigan D, Chaney D, and Shillolo A (2017). "Short-term Cities: Airbnb's Impact on Canadian Housing Markets." *Policy report. Urban Politics and Governance research group*, School of Urban Planning, McGill University.

Wieditz T (2017). "Squeezed Out: Airbnb's Commercialization of Home-Sharing in Toronto." *Policy report prepared for FAIRBNB*.CA Coalition.