



---

## Central European Economic Journal

---

Kristóf Gyódi<sup>1</sup>

# Airbnb and the Hotel Industry in Warsaw: An Example of the Sharing Economy?

---

<sup>1</sup> University of Warsaw, Faculty of Economic Sciences, e-mail: kgyodi@wne.uw.edu.pl.

**Abstract:** The aim of this analysis is to examine the characteristics of the Airbnb network, to verify the share of Airbnb offers that belong to the sharing economy and to identify the differences between the spatial distribution of the Airbnb network and the traditional hotel industry. The article is based on a unique dataset of web-scraped data on Airbnb listings in Warsaw (Poland), combined with district-level official statistics on the hotel industry. The analysis shows that only approximately 11% of offers belong to the sharing economy (“individuals granting each other temporary access to their under-utilised assets”), while at least one third of offers are provided by professional firms. The Airbnb network shows a strong centre-periphery pattern, with 75% of offers located within a range of 4.3 kilometres from the centre. The spatial concentration of Airbnb offers is strongly driven by their distance from metro lines, while it is weakly related to the amount of living space. On the district-level, the spatial distribution of Airbnb listings is correlated with that of the hotel industry, although Airbnb contributes to a more even spread of tourism in the city. The major contribution of this analysis is its presentation of the size and characteristics of the platform, which is essential for data-driven policy making.

**Keywords:** sharing economy, tourism, platforms, digitalization.

**JEL Codes:** L83, L11, R30

## Acknowledgements

I would like to thank Łukasz Nawaro for preparing the web-scraping application, which was a major input in the analysis. I would also like to express gratitude to dr Maciej Wilamowski for assigning the Airbnb listings to city districts.

## 1 Introduction

Consumption habits and the provision of services have undergone significant changes in recent years. The development of information and communication technology (ICT) has facilitated the emergence of new distribution channels based on the constant flow and exchange of data between users and information systems. The Internet and portable smart devices have radically increased the potential of platforms by easing the interactions between users. Online platforms that operate in two- or multi-sided markets facilitate interactions between two or more distinct (but interdependent) groups of users, generating value for at least one of the groups (European Commission 2015). Platforms such as electronic marketplaces reduce buyer search costs, therefore increasing allocational efficiency, lowering prices and increasing competition (Bakos 1997). Furthermore, online platforms are able to scale their activity and expand in a more flexible way than traditional firms due to the effects of networks.

These developments have become crucial drivers of economic change, having a significant impact on the whole economy (European Commission 2015).

By mitigating moral hazard and reducing transaction risk, online platforms not only enable business-to-consumer transactions, but also support direct consumer-to-consumer transactions between peers. In the digital age, assets can be easily shared with others; hence, consumers do not have to purchase goods that they are only going to use temporarily. The ease of peer-to-peer collaboration has made way for a business model often referred to as the **sharing economy** or **collaborative economy**. While the sharing economy has different definitions in the literature, it can be defined as “consumers granting each other temporary access to their under-utilized physical assets (‘idle capacity’), possibly for money” (Meelen and Frenken 2015). Such a model can lead to the more efficient usage of resources and sustainable consumption (Frenken 2017).

However, online platforms have led to significant regulatory challenges, as they are not only used for the exchange of goods and assets, but also for the provision of services. Platforms have significantly lowered the entry barriers in heavily regulated services – most notably in the areas of urban passenger transportation and the provision of accommodation. Services mediated via platforms have gained significant market shares and seem to be substitutes (at least to a certain extent) for services supplied by traditional firms (Zervas *et al.*

2017; Guttentag and Smith 2017). Many platforms have proved to be disruptive innovators, changing the value proposition in different economic sectors.

One such disruptive innovator is Airbnb, which defines itself as a “trusted community marketplace”.<sup>1</sup> Airbnb connects the owners of various types of accommodation with individuals looking for a place to stay overnight. Airbnb simply provides the ICT infrastructure to carry out the transaction; it does not own any of the listed properties. The major innovation introduced by Airbnb’s business model is the facilitation of flat-sharing as an alternative to traditional hospitality services. Although there have been popular flat-sharing initiatives before Airbnb, such as Couchsurfing, Airbnb has been the first successful company to have created a market for such transactions and to have provided flat owners with the opportunity to earn income. The Airbnb network has grown enormously since its foundation in 2008: the current number of listings is over three million (it has more than tripled in the last two years) in 65,000 cities and 191 countries (Airbnb 2017).

Advocates of Airbnb argue that the platform generates income for owners of assets and facilitates the spread of tourism to new places (Quattrone *et al.* 2016). On the other hand, Airbnb may create negative externalities, depending on the structure and characteristics of offers. When hosts offer a free room in their homes to tourists, a consumer-to-consumer transaction takes place in the spirit of the sharing economy. However, if tourists are offered entire flats, there is a large probability that these homes are missing from the residential rental market. Airbnb creates an incentive for property owners to earn an additional premium over the residential market, which can push up rental prices and lead to the gentrification of city districts (Lee 2016). The platform can also be used by professional firms, which then provide services under the auspices of the sharing economy. Empirical evidence from European cities reveals that “multi-listings” (belonging to hosts that own more than one listing) comprise a considerable proportion of Airbnb offers (Coyle and Yeung 2016), suggesting that private investors and companies are purchasing apartments for the provision of **business-to-consumer** transactions. Therefore, the characteristics of Airbnb offers have to be examined in order to verify whether Airbnb is benefiting local communities.

<sup>1</sup> Airbnb: About us (available: <https://www.airbnb.com/about/about-us>).

Despite the extensive regulatory challenges, there are many research gaps in the literature on the functioning and impact of Airbnb. Airbnb does not disclose regular city or country level data on its activity, which makes it difficult to assess the exact size of its network. The structure and spatial patterns of Airbnb networks have been left largely unexplored in Central European cities, making it difficult for local authorities to make data-driven decisions.

The aim of this article is to examine the characteristics of Airbnb supply in Warsaw and to contribute to the regulatory debate through the use of market data.

Warsaw is Poland's largest city, with the highest number of tourists: 3.2 million in 2016 (Statistical Office in Warsaw 2017). Airbnb remains largely unregulated in the city, making it a relevant case study for an examination of the outcome of a non-regulation scenario in Central Europe.

The analysis seeks to answer the following research questions:

1. What is the size and capacity of the Airbnb network in Warsaw?
2. What is the approximate share of offers provided by professional businesses on the platform?
3. To what extent is Airbnb part of the sharing economy?
4. Does Airbnb contribute to the spread of tourism to districts in which the traditional hotel industry has been less concentrated?

The analysis is based on a unique dataset of Airbnb listings, which contains all of the offers available on the platform within the city. The structure of Airbnb offers is examined in terms of geographical distribution, type of accommodation and hosts. Furthermore, the Airbnb network is compared to traditional accommodation providers on the city district level, based on official statistics from the Central Statistical Office's Local Data Bank.

The article consists of the following sections: the second section introduces the relevant literature on the sharing economy and Airbnb. The dataset is presented in the third section, while the characteristics of the Airbnb network are described in the fourth section. The fifth section provides a district-level comparison between the hotel industry and Airbnb. The analysis ends with some conclusions.

## 2 Literature review

How can we define the sharing economy and the companies that are part of it? This question has been heavily debated in the literature. The sharing economy is intertwined with the concept of **collaborative consumption**, which gained a wider research interest after 2010 (although Belk already began to discuss the concept and future of sharing in the digital era in 2007). Botsman and Rogers (2010) were the first to introduce the term "collaborative consumption" in the context of peer-to-peer online communities, including various activities within it: sharing, bartering, lending, renting, gifting and the swapping of assets. Bardhi and Eckhardt (2012), on the other hand, argue that "sharing" is not an appropriate term to describe the activity of car-sharing firms like Zipcar (where consumers can gain access to cars for short-term periods). The authors propose the term **access-based consumption**, focusing on the difference between sharing and granting access to ownership. According to the authors, car-sharing lacks the characteristics of sharing, including a joint sense of ownership or a feeling of responsibility towards the assets. As argued by these authors, a market-mediated exchange of goods and services between people who do not know each other is not sharing, but the granting of access.

A highly cited paper by Belk (2014), on the other hand, contests the claims of Bardhi and Eckhardt, arguing that "access-based consumption" is only a subset of collaborative consumption, which is "people coordinating the acquisition and distribution of a resource for a fee or other compensation" (Belk 2014, 1597). This definition, in contrast to Botsman and Rogers (2010), excludes gift-giving or sharing without any form of compensation. It is worth noting that both definitions of "access-based consumption" and "collaborative consumption" include business-to-consumer services, such as Spotify or Zipcar (Böcker and Meelen 2016).

Hamari *et al.* (2015) focus on the technological developments that have facilitated user-generated content and collaboration. According to the authors, open-source software, online collaboration, file sharing and peer-to-peer financing are all examples of the sharing economy, while collaborative consumption is a sub-category of this technological phenomenon. Their definition of collaborative consumption is as follows: the "peer-to-peer-based activity of obtaining, giving, or sharing the access to goods and services, coordinated through community-based online services" (Hamari *et al.* 2015). Therefore, the authors view collaborative consumption

or the sharing economy as umbrella concepts for the sharing of goods and services via online platforms.

Finally, Meelen and Frenken (2015) define the sharing economy as “consumers granting each other temporary access to their under-utilized physical assets (“idle capacity”), possibly for money”. The authors emphasize that the provision of professional services should be excluded from this landscape (such as Uber X).

To conclude, the literature is divided on the criteria for the sharing economy or collaborative consumption. If we follow the definition of Belk or Hamari *et al.* (2015), Airbnb is part of the sharing economy; if we are to follow Bardhi and Eckhardt, however, it rather belongs to access-based consumption.

On the other hand, if we interest ourselves in the cost and benefits of platform-based service providers, the question becomes less complex. Adhering to the definition provided by Meelen and Frenken (2015), we need to examine the extent to which Airbnb generates value from idle capacity. An offer that fulfils the criteria of the sharing economy makes value from an asset that would otherwise remain idle, such as a free room in one’s permanent home. However, if a property is withdrawn from the housing market and turned into accommodation for tourists, it would still generate income for the owner in the absence of Airbnb. In this case, Airbnb is not making use of an underused asset; therefore, such a practice should not be considered part of the sharing economy (Meelen and Frenken 2015).

In fact, examples of local regulations for Airbnb include the control of such measures: New York requires the host to be present in the rented flat (Guttentag 2015); in Berlin, a special permit is required if the rented space exceeds 50% of the property space (Oltermann 2016); while in Paris, flats can only be rented for less than 120 days annually (Vidalon 2017).

Relevant empirical literature on Airbnb is rather narrow. The spatial pattern of Airbnb has been discussed by Quattrone *et al.* (2016), who examine the Airbnb network in London and show that it covers a larger area of the city than traditional hotels. However, the number of listings decreases as the distance from the various city centres increases. The authors also examine the changes in the network over time, finding that the network was more centralized in the entry phase, while the more bohemian, suburban districts gained importance as the platform matured. Gutierrez *et al.* (2017) have conducted a spatial analysis of the Airbnb network in Barcelona, concluding that Airbnb is strongly concentrated in the historic city centre, expanding out into

a wider area of the city centre than traditional hotels. Furthermore, the spatial distribution of Airbnb is more regular, showing a centre-periphery pattern, while traditional hotels reveal more complex patterns. Coyle and Yeung (2016) examine Airbnb in 14 major European cities, and find that the share of multi-listings ranges between around 30% (Barcelona) and 9% (Paris). The impact of Airbnb on the hotel industry has been discussed by Zervas *et al.* (2014), Neeser (2015) and Fang *et al.* (2015). Egan and Nield (2000) have developed a model discussing the location choice of hotels, while Shoval (2006) has empirically examined the impact of location on hotel prices.

### 3 The dataset

The main goal of this work is to analyse the Airbnb network in Warsaw. Therefore, a key factor of the analysis is the preparation of an adequate dataset containing data on all of the Airbnb listings in Warsaw. The market data were collected from the Airbnb website in October 2017 using the web-scraping methodology. Web-scraping is an innovative method of collecting data from websites with the use of a web-crawler. The web-scraping script has been prepared by Łukasz Nawaro (University of Warsaw). Following the collection of observations, the data are structured and filtered for the analysis. As Airbnb returns maximum 300 offers for one enquiry (such as searching for accommodation for one person in Warsaw), the web-scraping required a longer list of geographically-specific requests (districts, smaller administrative units, main streets, etc.). In order to find all of the listings in Warsaw, regardless of their availability on a given date, the search requests did not contain dates. The data collected from the website include the location (longitude and latitude), the room type and a link to the host profile. Based on the harvested geographical data, the distance from the city centre (Palace of Culture and Science) and the nearest metro station was calculated for every listing (using Vincenty’s solution to the inverse geodetic problem). Furthermore, each listing has been paired with its respective city district based on data from CODGIK (Centralny Ośrodek Dokumentacji Geodezyjnej i Kartograficznej). Additionally, the unique links to the host profiles enabled the calculation of the number of listings owned by a given host. The dataset has been combined with official district-level statistics (Central Statistical Office: Local Data Bank) on tourist accom-

modation establishments (data from July 2017) and dwelling stocks (data from 2016). The Airbnb dataset is available for download and further analysis at link: <http://www.delab.uw.edu.pl/datasets/>.

## 4 The Airbnb network in Warsaw

There are 4,497 offers overall within the Warsaw area. In comparison, there were around 12,000 offers in Berlin in January 2015,<sup>2</sup> while Budapest stands at 9,250 offers.<sup>3</sup> However, Warsaw is smaller and also relatively less visited by tourists than the other cities mentioned: according to Eurostat, the number of **nights spent in a tourist accommodation establishment per resident** was 2.8 in Warsaw, 4.6 in Budapest and 8.4 in Berlin in 2014.<sup>4</sup>

Regarding the type of accommodation, 76.9% of listings are entire homes, around every fifth listing is a private room (21%) and just 2.1% are shared rooms. These proportions reveal that the overwhelming majority of offers concern the rental of entire flats and apartments. These offers can rarely be considered to be part of the sharing economy; following the definition by Meelen and Frenken (2015), the only possible situation in which this could be the case is if the owners temporarily rent their homes on the platform, e.g., during a trip from the city. However, practices such as these are cumbersome (somebody has to be there to check in the tourists) or risky (“shall we leave the keys to the house in the letterbox?”); therefore, it is highly probable that they form a negligible minority. The rental of private rooms is much closer to the idea of the sharing economy, as such offers would imply that the hosts are offering up free space in their permanent homes. On the other hand, it is not uncommon for a flat to be divided up into several bedrooms and offered separately on the platform; therefore, the proportion of offers closer to the spirit of the sharing economy is even less. Finally, shared rooms constitute the smallest group of offers. The character of such offers is mixed, as some hosts invite tourists to their own homes, while several traditional hostels also advertise their rooms on Airbnb under this category.

The ownership structure on Airbnb reveals to us whether hosts own single listings or whether a concentration of property is taking place on the platform. Fig. 2.

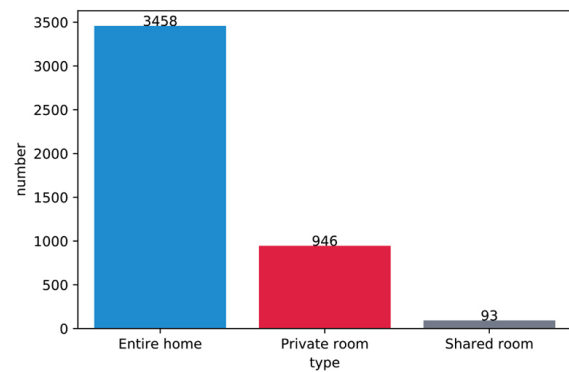


Fig. 1. The number of Airbnb offers by room type  
Source: Author's own calculation.

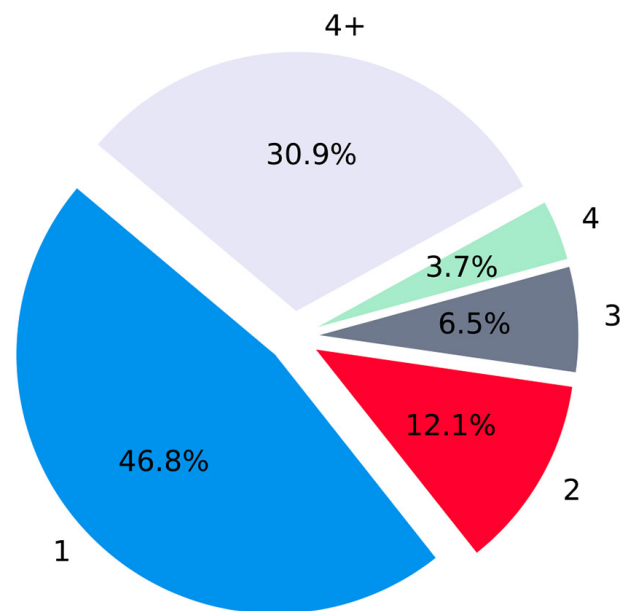


Fig. 2. Airbnb supply by ownership structure: Share of Airbnb listings by the number of listings owned by host  
Source: Author's own calculation

shows that the majority of offers are multi-listings: 53.2% of listings belong to hosts that own more than one accommodation. This share is much higher than those reported in Western European capitals (Coyle and Yeung 2016). Furthermore, 30.9% of Airbnb listings belong to hosts listing more than four offers. These numbers suggest the strong presence of investors and professional firms, who are using the platform to provide business-to-consumer services. This process may put pressure on the home rental market and increase flat prices. Furthermore, if not recognized in time, it can contribute to the gentrification of specific areas, e.g., districts in the vicinity of tourist attractions.

<sup>2</sup> Source: [Airbnbsberlin.com](http://airbnbsberlin.com).

<sup>3</sup> Source: [airdna.com](http://airdna.com).

<sup>4</sup> Source: Eurostat: Culture and tourism – cities and greater cities [urb\_tour].

Tab. 1. Share of Airbnb listings by type and by the number of listings owned by host

	1	2	3	4	4+
Entire home	46.3%	11.2%	5.6%	3.3%	33.6%
Private room	8.4%	15.2%	9.3%	5.4%	21.7%
Shared room	46.2%	11.8%	12.9%	4.3%	24.7%

Source: Author’s own calculations.

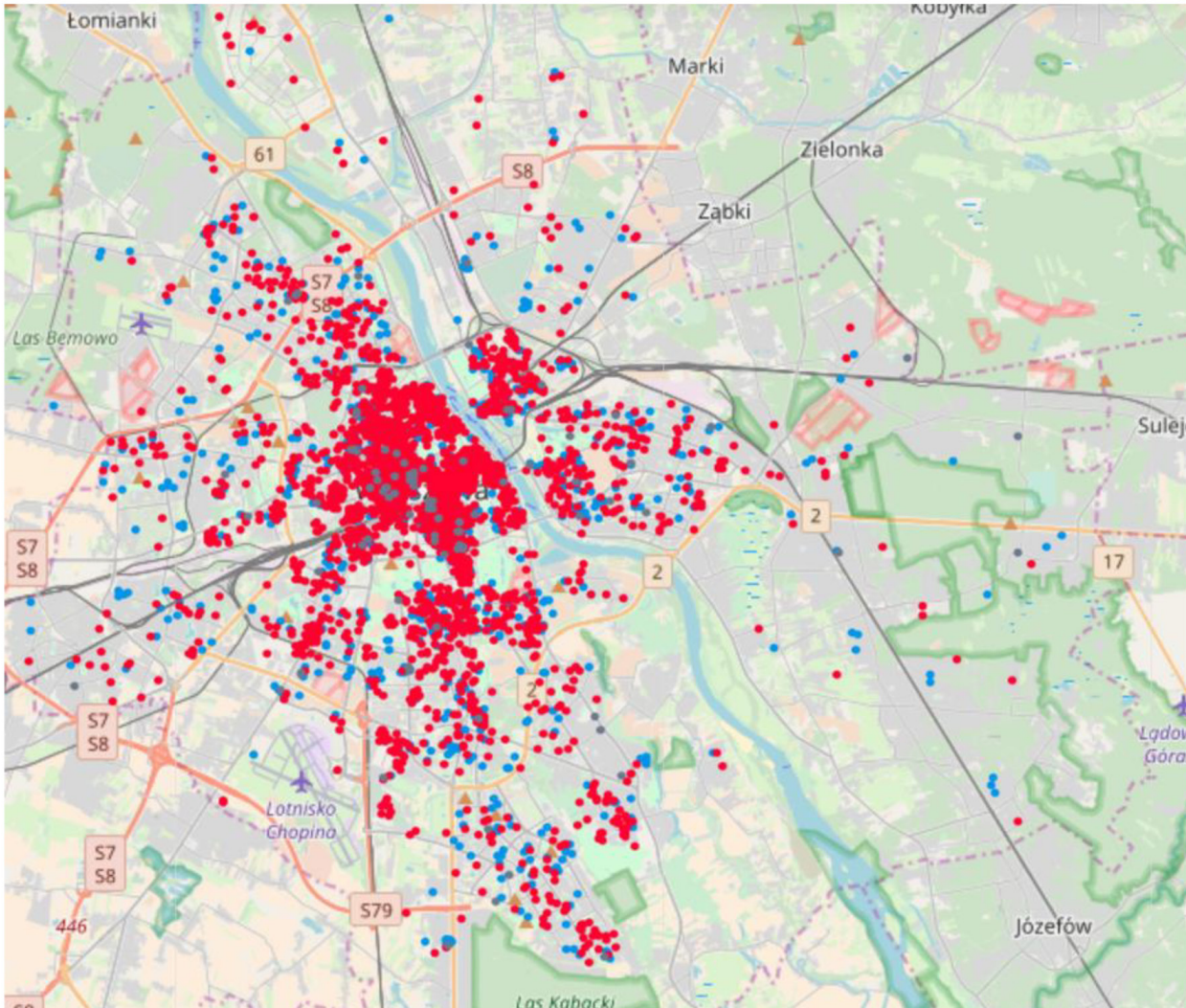


Fig. 3. The Airbnb network on a map of Warsaw

Source: Author’s own calculation.

Tab. 1. presents the different types of accommodation by ownership structure. Only 46.3% of private rooms and 46.2% of shared rooms are single listings (458 and 43, respectively). When the same host offers multiple rooms, it is highly probable that the entire flat has been turned into a hotel supply. Therefore, the approxi-

mate share of listings that fulfil the criteria of the sharing economy is made up of private rooms and shared rooms that are single listings, or only 11.14% of all offers. The rest of the offers are entire homes that have been withdrawn from the home rental market and turned into accommodation.

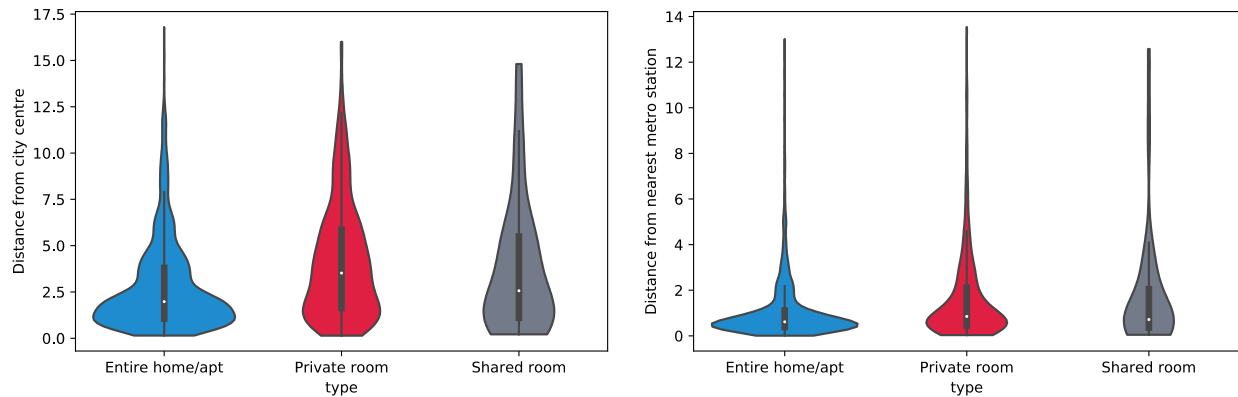


Fig. 4. Violin plots of the distance of Airbnb listings from the city centre and the nearest metro station  
Source: Author's own calculation.

Next, the spatial allocation of Airbnb listings is examined. Fig. 3. presents the Airbnb network on a map of Warsaw. A strong centre-periphery pattern is visible on the map, with most apartments concentrated in the city centre (similar to Barcelona, as reported by Gutierrez *et al.* 2017). This suggests that the Airbnb supply is primarily determined by the closeness of the listing to the city centre, while those residential areas in which the sharing economy should primarily take place are less important. Additionally, Airbnb listings are more densely located in the vicinity of metro lines.

The conclusions drawn from the map are additionally tested with visualizations of the network distribution by both distance from the city centre and distance from the nearest metro station. Fig. 4. is based on violin plots, which show the kernel density estimation on the density function of the visualized population, along with a box plot. The visualized distributions also confirm that the largest share of the Airbnb network is made up of apartments located in a close ring around the city centre. Private rooms, and especially shared rooms, are more evenly distributed across the city. The median distance from the centre is less than two kilometres in the case of entire homes and 3.5 kilometres for single rooms. Half of the entire network is within a radius of 2.1 kilometres from the city centre, and 75% is within 4.28 kilometres.

The figure on the left shows that the distance from the nearest metro station is a crucial driver of Airbnb offers, as the median distance is under a kilometre for all types of listings.

To sum up, only a small fraction of the offers (11.1%) are based on the idea of individuals granting access to each other's under-utilized physical assets, while the rest of the offers take the form of short-term home rentals or hostels. Of the 2,639 hosts on the platform, 536 own

more than one accommodation, which suggests strong professional business activity. The Airbnb network demonstrates a strong centre-periphery pattern, while the main determinant of location is the distance of the offer from metro lines.

## 5 Airbnb and traditional accommodation providers: a district-level analysis

The analysis continues with a comparison of the Airbnb network to traditional accommodation providers, using district-level statistics on the size of the hotel industry in Warsaw. The aggregate measure for **all accommodation providers** (in Warsaw, these are made up of hotels, motels, other hotel facilities, youth hostels, school youth hostels, training centres, hostels, private rooms for rent and other establishments) is used, of which the category of **hotels** (between one and five stars) is also examined.

Firstly, the relative size of Airbnb is determined by calculating the guest capacity of listings across the city's districts and comparing them to the number of bed places available in the hotel industry (Tab. 2). Overall, the current capacity of the Airbnb network is 15861 bed places, while the supply of the entire hotel industry is 31021 bed places. Therefore, Airbnb has increased Warsaw's guest capacity by 51.12%.

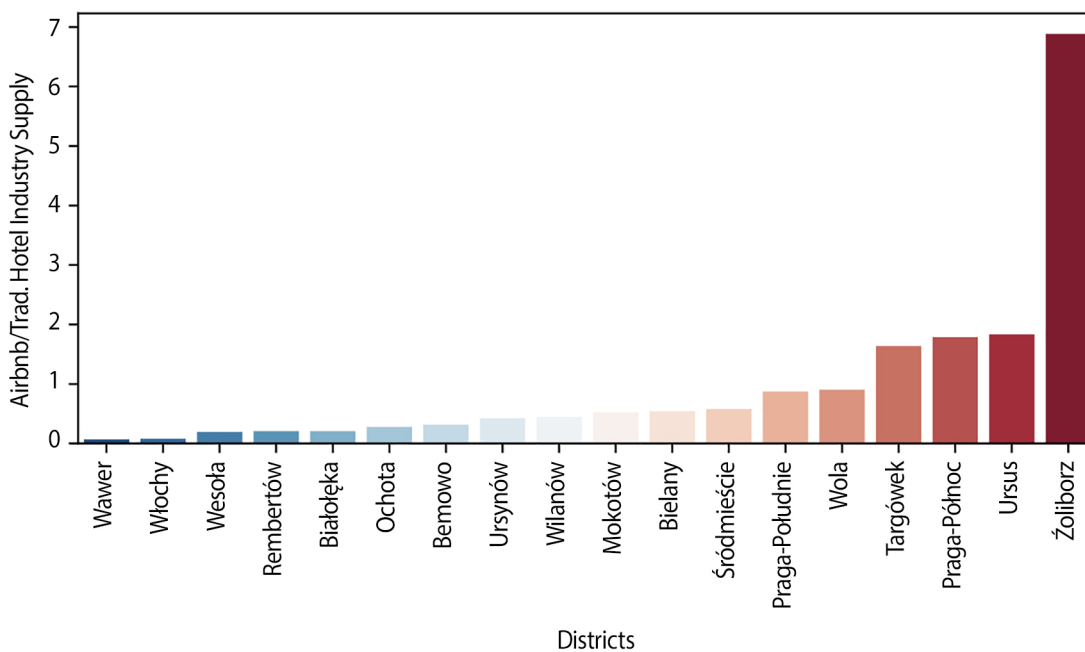
When comparing the capacity of the two business models across the districts, the differences in their spatial concentration become visible (Fig. 5). Airbnb has become greater than the entire traditional hotel industry in several districts, especially in Żoliborz, where the number of Airbnb bed places is almost seven times



Tab. 2. Comparison of the supply of Airbnb and traditional hospitality services by district

Districts	All tourist objects: number	bed places	Hotels: number	bed places	Airbnb number	bed places	Airbnb bed pl./ All tourist ob. bed pl.
Bemowo	4	491	3	336	51	155	31.6%
Białołęka	7	669	5	477	34	139	20.8%
Bielany	5	499	2	208	95	270	54.1%
Mokotów	21	3,183	7	2,259	508	1659	52.1%
Ochota	11	2,868	5	2,188	222	800	27.9%
Praga-Poł.	8	896	3	694	236	783	87.4%
Praga-Pół.	5	382	2	225	195	682	178.5%
Rembertów	2	112	0	0	7	23	20.5%
Śródmieście	49	11,921	26	10,173	1903	6921	58.1%
Targówek	1	99	1	99	48	162	163.6%
Ursus	1	30	0	0	17	55	183.3%
Ursynów	9	1,229	5	1,102	158	520	42.3%
Wawer	12	1,758	4	547	31	121	6.9%
Wesoła	1	175	1	175	6	34	19.4%
Wilanów	4	446	2	274	50	200	44.8%
Włochy	14	3,191	12	3,039	71	249	7.8%
Wola	13	3,020	8	2,484	753	2730	90.4%
Żoliborz	1	52	0	0	112	358	688.5%

Source: Author's own calculations.


 Fig. 5. The share of Airbnb's guest capacity relative to the bed places offered by all other accommodation providers by district  
 Source: Author's own calculations.

Tab. 3. Distribution of Airbnb and traditional hospitality services supply by district

Districts	Useful floor area of dwellings	Airbnb number	All tourist objects number	Hotels number	Airbnb bed places	All tourist objects bed places	Hotels bed places
Bemowo	6.31%	1.1%	2.4%	3.5%	1.0%	1.6%	1.4%
Białołęka	6.81%	0.8%	4.2%	5.8%	0.9%	2.2%	2.0%
Bielany	6.63%	2.1%	3.0%	2.3%	1.7%	1.6%	0.9%
Mokotów	12.94%	11.3%	12.5%	8.1%	10.5%	10.3%	9.3%
Ochota	4.48%	4.9%	6.5%	5.8%	5.0%	9.2%	9.0%
Praga-Poł.	9.29%	5.2%	4.8%	3.5%	4.9%	2.9%	2.9%
Praga-Pół.	2.83%	4.3%	3.0%	2.3%	4.3%	1.2%	0.9%
Rembertów	1.40%	0.2%	1.2%	0.0%	0.1%	0.4%	0.0%
Śródmieście	7.07%	42.3%	29.2%	30.2%	43.6%	38.4%	41.9%
Targówek	5.67%	1.1%	0.6%	1.2%	1.0%	0.3%	0.4%
Ursus	2.91%	0.4%	0.6%	0.0%	0.3%	0.1%	0.0%
Ursynów	9.17%	3.5%	5.4%	5.8%	3.3%	4.0%	4.5%
Wawer	5.77%	0.7%	7.1%	4.7%	0.8%	5.7%	2.3%
Wesoła	1.84%	0.1%	0.6%	1.2%	0.2%	0.6%	0.7%
Wilanów	3.62%	1.1%	2.4%	2.3%	1.3%	1.4%	1.1%
Włochy	2.69%	1.6%	8.3%	14.0%	1.6%	10.3%	12.5%
Wola	7.34%	16.7%	7.7%	9.3%	17.2%	9.7%	10.2%
Żoliborz	3.22%	2.5%	0.6%	0.0%	2.3%	0.2%	0.0%

Source: Author's own calculations.

higher than that of all other accommodation providers. Airbnb also surpasses the traditional industry with more bed places in Ursus, Targówek and Praga-Północ, and it has roughly the same amount in Praga-Południe and Wola.

Tab. 3. presents the data as the share of the district out of the overall supply, e.g., the share of Airbnb listings located in Bemowo is 1.1% of all of the Airbnb listings in Warsaw (the sum of the rows adds up to 100%).

The first column provides information on the useful floor area of dwellings located in a given district, in order to identify those districts with the largest residential space. In the case of services that meeting the criteria for the sharing economy, the geographical distribution of offers should be related to the distribution of available assets. However, in the case of Airbnb, this seems not to be the case. The table confirms our previous observations on the centre-periphery pattern of the Airbnb network: 42% of Airbnb listings are located in the central area (Śródmieście), where 7% of Warsaw's residential space is located. The relationship between the stock of available residential space and Airbnb listings is in balance in

some well-communicated inner districts like Mokotów or Ochota, while the share taken by Wola in the network is more than twice than what its dwelling stock would suggest. However, residential suburban districts are all underrepresented (e.g., Białołęka and Ursynów).

How does this pattern of spatial concentration compare to that of traditional accommodation providers? Based on the number of buildings, it seems that traditional accommodation providers are less concentrated in the city centre (29%), while they occupy a higher share in outer districts like Białołęka, Wawer or Włochy. However, traditional hotels vary greatly in terms of size and bed places; therefore, a comparison based on the number of buildings could be misleading. Based on actual guest capacity, the concentration of the two business models is becomes more similar in the city centre: 38.4% (all tourist accommodation types) and 43.6% (Airbnb). The differences in their relative dispersion across districts also decrease in the residential outer districts (e.g., Bemowo, Bielany, Białołęka and Rembertów). In Włochy and Wawer, the hotel industry has a big presence, while the Airbnb network occupies a

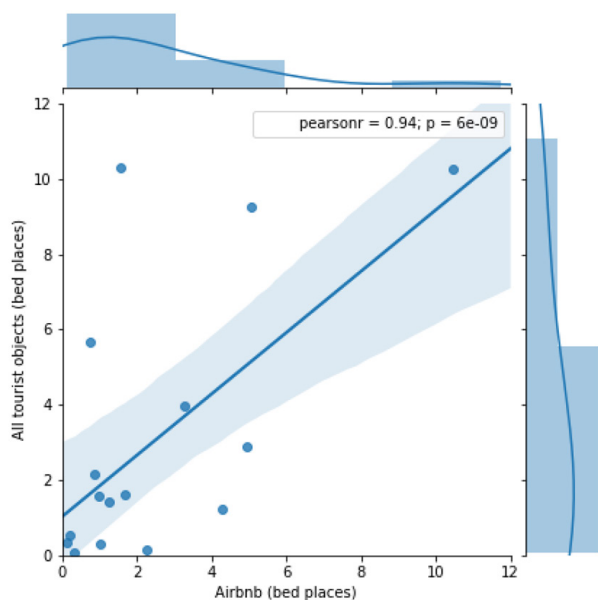


Fig. 6. District shares of Airbnb and traditional accommodation bed places (excluding Śródmieście)

Source: Author's own calculations.

higher share in both Praga districts, Ursus and Żoliborz. This may suggest that Airbnb takes precedence over traditional accommodation providers in the suburban districts.

Fig. 6. presents the shares of both business models by district (columns 5 and 6), with the exclusion of the Śródmieście district. Each dot represents a given district. The figure also contains a simple linear regression, showing that the observations are positioned around a diagonal line. This means that the concentration of the two business models on the district level is not significantly different.

To conclude, the spatial distribution of the guest capacities of the two business models suggests a correlation on a district level. They are both heavily concentrated in the city centre, with relatively little capacity in the most distant, residential districts. They seem to complement one another in a few areas: while the traditional hotel industry is stronger in Włochy or Wawer, Airbnb is more concentrated in Wola and Żoliborz. Despite the centre-periphery pattern of Airbnb, it has substantially increased the accommodation capacity of all suburban districts, in a few cases outpacing even the traditional hotel industry. However, the analysis suggests that Airbnb's supply is driven by access to public transportation and closeness to the city centre.

## 6 Conclusions

While Airbnb has great potential to benefit local communities and contribute to the more even distribution of tourism, the platform may also cause negative externalities. This work addresses this research gap by analysing the structure and characteristics of the Airbnb network in Warsaw. The analysis answers a number of crucial questions on the activity of Airbnb:

1. There are 4,497 accommodation offers in Warsaw, providing 15,861 bed places, which is more than 50% of the capacity of all traditional accommodation providers;
2. At least 31% of offers are provided by professional businesses;
3. Only 11% of Airbnb offers are consumer-to-consumer services, thus fulfilling the criteria of the sharing economy ("individuals granting access to each other's under-utilized physical assets");
4. Airbnb is strongly concentrated in the city centre, while in suburban areas, the distance of listings from metro lines seems to be the main determinant of location;
5. The spatial distribution of Airbnb offers is correlated with the traditional hotel industry, although they complement one another in a number of residential districts. This suggests that Airbnb supports the more even spread of tourism.

While Airbnb may be highly beneficial to home-owners and tourists, policy-makers also need to be aware of the risks of the platform. As the overwhelming majority of Airbnb offers are entire homes (3,458 homes), Airbnb decreases the number of flats available on the home rental market. Additionally, the share of private investors and professional businesses who purchase flats for Airbnb rental is high: 53% of offers are multi-listings, while 31% belong to hosts offering more than four listings. Airbnb listings are offered in the most attractive parts of the city (75% of them are less than 4.3 kilometres from the Palace of Culture and Science, and 90% are less than three kilometres from the nearest metro station), making it more difficult for locals to find a flat for long-term rental in these areas. In order to prevent Airbnb from having a negative impact on the housing market, regulators can choose from a number of solutions that have already been implemented in other capital cities. An adequate approach is to preserve offers that fulfil the criteria for the sharing economy on the platform, while controlling the business offers. As an example, rentals exceeding

50% of the apartment's space could be restricted with permits, as is the case in Berlin (Oltermann 2016). Such a measure would maintain the right to practice sharing economy transactions while avoiding rising rents or the gentrification of major city areas.

Furthermore, policy-makers need to maintain a level playing field for competition. The question of whether the tax burden is of similar magnitude for accommodation providers on Airbnb and the hotel industry should be assessed. As Airbnb is already a major player in the field of accommodation provision, the city has to verify its impact on income from tourism. In order to enable data-driven decision making, it is necessary to constantly monitor the Airbnb network.

The major contribution of this analysis its provision of data for the public debate on the regulation of flat-sharing services mediated by online platforms. This article is the first empirical analysis on the size of the sharing economy in Poland.

## References

- [1] Bakos, J. Yannis. 1997. "Reducing Buyer Search Costs: Implications for Electronic Marketplaces." *Management Science*, 43(12): 1676–1692.
- [2] Bardhi, Fleura, and Giana M. Eckhardt. 2012. "Access-Based Consumption: The Case of Car Sharing." *Journal of Consumer Research* 39: 881–898.
- [3] Belk, Russel. 2007. "Why Not Share Rather Than Own?" *The Annals of the American Academy of Political and Social Science* 611: 126–140.
- [4] Belk, Russel. 2014. "You Are What You Can Access: Sharing and Collaborative Consumption Online." *Journal of Business Research* 67(8): 1595–1600.
- [5] Belk, Russel. 2010. "Sharing." *Journal of Consumer Research* 36: 715–734.
- [6] Böcker, Lars, and Toon Meelen. 2017. "Sharing for People, Planet or Profit? Analysing Motivations for Intended Sharing Economy Participation." *Environmental Innovation and Societal Transitions* 23: 28–39.
- [7] Botsman, Rachel, and Roo Rogers. 2010. *What's Mine is Yours. The Rise of Collaborative Consumption*. New York: Harper Collins.
- [8] Coyle, Diane, and Timothy Yu-Cheong Yeung. 2016. "Understanding Airbnb in Fourteen European Cities." *The Jean-Jacques Laffont Digital Chair Working Papers*.
- [9] Egan, J. David, and Kevin Nield. 2000. "Towards a Theory of Intraurban Hotel Location." *Urban Studies* 37(3): 611–621.
- [10] European Commission. 2015. "Regulatory Environment for Platforms, Online Intermediaries Data and Cloud Computing and the Collaborative Economy." [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=10932](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=10932) (accessed: 20.05.2017).
- [11] Fang, Bin, Ye, Qiang, and Rob Law. 2016. "Effect of sharing economy on tourism industry employment." *Annals of Tourism Research* 57: 264–267.
- [12] Frenken, Koen. 2017. "Political economies and environmental futures for the sharing economy." *Philosophical Transactions of the Royal Society A*, 375: 2095.
- [13] Gutiérrez, Javier, Juan Carlos García-Palomares, Gustavo Romanillos, and Maria Henar Salas-Olmedo. 2017. "The Eruption of Airbnb in Tourist Cities: Comparing Spatial Patterns of Hotels and Peer-to-Peer Accommodation in Barcelona." *Tourism Management* 62: 278–291.
- [14] Guttentag, A. Danial. 2015. "Airbnb: Disruptive Innovation and the Rise of an Informal Tourism Accommodation Sector." *Current Issues in Tourism* 18(12): 1192–1217.
- [15] Guttentag, A. Danial, and Stephen L.J. Smith. 2017. "Assessing Airbnb as a Disruptive Innovation Relative to Hotels: Substitution and Comparative Performance Expectations." *International Journal of Hospitality Management* 64: 1–10.
- [16] Hamari, Juho, Sjöklint, Mimmi, and Antti Ukkonen. 2015. "The Sharing Economy: Why People Participate in Collaborative Consumption." *Journal of the Association for Information Science and Technology* 67(9): 2047–2059.
- [17] Lee, Dayne. 2016. "How Airbnb Short-Term Rentals Exacerbate Los Angeles's Affordable Housing Crisis: Analysis and Policy Recommendations." *Harvard Law & Policy Review* 10: 229–253
- [18] Meelen, Toon, and Koen Frenken. 2015. "Stop Saying Uber Is Part of the Sharing Economy." <https://www.fastcompany.com/3040863/stop-saying-uber-is-part-of-the-sharing-economy> (accessed 10.08.2017).
- [19] Neeser, David, Martin Peitz, and Jan Stuhler (2015). "Does Airbnb hurt hotel business: Evidence from the Nordic countries." *Universidad Carlos III de Madrid*.
- [20] Oltermann, Philip. 2016. "Berlin Ban on Airbnb Short-Term Rentals Upheld by City Court." <https://www.theguardian.com/technology/2016/jun/08/berlin-ban-airbnb-short-term-rentals-upheld-city-court> (accessed: 20.05.2017).
- [21] Quattrone, Giovanni, Davide Proserpio, Daniele Quercia, Licia Capra, and Mirco Musolesi. 2016. "Who Benefits from the Sharing Economy of Airbnb?" In: *Proceedings of the 25th International Conference on World Wide Web*. International World Wide Web Conferences Steering Committee.
- [22] Shoval, Noam. 2006. "The Geography of Hotels in Cities: An Empirical Validation of a Forgotten Model." *Tourism Geographies* 8(1): 56–75.
- [23] Statistical Office in Warsaw. 2017. *Turystyka w M.St. Warszawie w 2016 r.*
- [24] Vidalon, Dominique. "Hoteliers Welcome Paris Decision Forcing Airbnb Hosts to Register Rentals." <https://www.reuters.com/article/us-france-airbnb/hoteliers-welcome-paris-decision-forcing-airbnb-hosts-to-register-rentals-idUSKBN19Q1YW> (accessed: 20.05.2017).
- [25] Zervas, Georgios, Davide Proserpio, and John W. Byers. 2017. "The Rise of the Sharing Economy: Estimating the Impact of Airbnb on the Hotel Industry." *Journal of Marketing Research* 54(5): 687–705.