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The spatio-temporal dynamics of the short-term rental market in Berlin (2008-2020) – The case of AirBnB

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Abstract

Over the last decade, the emergence and development of the digitally mediated short-term rental market (STR) has vastly disrupted urban housing and touristic accommodation markets. Whereas the fact about emergence and development of STR in cities is well-known, there are lesser insights on how this emergence and development takes place in space and time. In this short communication, we build on the case of Berlin – a city which has implemented a strict regulatory framework towards limiting housing misuse, including the provision of dwellings through short-term rental platforms – in order to explore the ways the short-term rental market emerged and expanded in the city. In doing so, we focus on both the spatial distribution of the listings and the quantitative attributes of the market, building on the analysis of data from the AirDNA dataset that contains all AirBnB listings ($n = 104,746$) in Berlin from 2008 to 2020. Our findings confirm the peak of spatial concentration of STR listings in predominantly central-city district tenement housing quarters which, since the 1990's, have gone through gentrification and touristification processes.

Zusammenfassung

In den letzten zehn Jahren hat die Entstehung und die Entwicklung von digital gestützten Kurzzeitvermietungen (STR) den städtischen Markt für Wohnraum und touristische Unterkünfte erheblich beeinflusst. Während die Tatsache der Entstehung und Entwicklung von STR in Städten bekannt ist, gibt es wenige Erkenntnisse darüber, wie diese Entstehung und Entwicklung räumlich und zeitlich abläuft. In dieser kurzen Mitteilung untersuchen wir am Beispiel von Berlin – einer Stadt, die einen verhältnismäßig strengen Regulierungsrahmen eingeführt hat, um die Zweckentfremdung von Wohnraum, einschließlich der Bereitstellung von Wohnungen über Kurzzeitmietplattformen, einzuschränken –, wie der Kurzzeitmietmarkt in der Stadt Fuß gefasst und sich ausgebreitet hat. Dabei liegt der Schwerpunkt sowohl auf der räumlichen Verteilung der Angebote als auch auf quantitativen Eigenschaften des Marktes. Zu diesem Zweck analysieren wir Daten aus dem AirDNA-Datensatz, der sämtliche AirBnB-Angebote ($n = 104.746$) in Berlin von 2008 bis 2020 umfasst. Die Ergebnisse zeigen die höchsten räumlichen Konzentration von STR-Angeboten in überwiegend innerstädtischen Gründerzeitvierteln, die seit den 1990er Jahren sowohl zahlreiche Gentrifizierungs- als auch Touristifizierungsprozesse durchlaufen haben.

Keywords short-term rentals, AirBnB, Berlin, spatial patterns, housing

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1. Introduction and general framework

Platform business models are rapidly expanding all over the globe, vastly disrupting economic, labour, cultural and urban landscapes. In this realm, the concept of ‘collaborative’ or ‘sharing’ economy – as part of the broader landscape of platform economy – gained increased popularity from the 2010s on (Martin 2016). Although the utilisation of terms and notions such as ‘sharing’ and ‘collaboration’ on behalf of actors of the platform economy has been highly controversial (see Kalamar 2013; Mozorov 2013), it has been most commonly employed towards the description of digitally mediated practices of exchange among strangers. These practices are present in different sectors of the economy (i.e. real estate, accommodation, transportation, labour) and involve the sharing of, as well as the access to, goods and services.

Platforms facilitating access to short-term accommodation have attracted the interest of urban planners and geographers, as well as local authorities and policy makers. Often operating on the margins of existing policy and regulatory frameworks, companies such as AirBnB and, more broadly, ‘platform real estate’ (Shaw 2020) practices have been associated with processes of private-led urbanisation (Balampanidis et al. 2019), touristification, gentrification and displacement (Cocola-Gant and Gago 2021; Pettas et al. 2021; Wachsmuth and Weisler 2018), commodification and financialisation of housing landscapes (Fields and Rogers 2021). Moreover, according to Guran and Phibbs (2017) and Meleo et al. (2016), in areas with high densities of short-term rentals (STRs), upwards pressures are also put in the rent prices in the conventional market.

In this short communication paper, we present an overview of the emergence and development of the STR market in Berlin, focusing on its geographical, quantitative and qualitative attributes. For this undertaking, we build upon an AirDNA dataset that contains all AirBnB listings ($n = 104,746$) in Berlin from 2008 to 2020. The dataset includes details for a series of geographical (e.g. district, latitude and longitude), quantitative (e.g. square meters, average income generated) and qualitative (e.g., type of listing, host-generated descriptions etc.) attributes of each listing. It has to be mentioned that the data processed and analysed stems from the AirDNA database; its interpretation, its integration within relevant research strands and findings are the intellectual achievement

of the authors. Our objective is to provide an overview of the spatio-temporal emergence and development of the STR market in Berlin, approximated by and invoking the case of AirBnB, as this platform dominates the Berlin and global STR market (89% of all global STRs are listed on AirBnB therein, *Transparent 2023*).

2. Emergence and development of the STR market

Since the first AirBnB registered private room in Berlin-Mitte in August 2008, almost 105,000 estates have been listed on the website until the end of 2020. The aforementioned, total number of listings from 2008 to 2020 corresponds to 5.3% of the city’s housing stock of almost two million estates in 2020. After a pioneer phase between 2008-2010 with early adapters of the STR model – by 2008 only six, by 2009 only 21, and 2010 only 235 Airbnb entries were listed – the early years were characterized by a breakthrough from 2011 on and later the annually doubling of active estates offered (e.g. 2013: 7,171, 2014: 14,448, 2015: 31,251) (see *Fig. 1* with lg-scale). The growth of active entries slowed down in the subsequent years due to various regulations implemented (e.g. diverse stages of law for the prohibition of misuse of housing (*Zweckentfremdungsverbot-Gesetz, ZwVbG*)) – and peaked in 2018 with 49,013 estates offered (2.5% of the city’s housing stock). Since then, numbers were declining and in 2020 one could choose from 37,177 spots to rent (1.9% of the city’s housing stock). Interestingly, despite the introduction of strict regulations and the subsequent drop in active listings, the amount of new entries (and therefore withdrawals) remained on a high level until the COVID-19-Pandemic drastically cut new entries by half (*Fig. 1*); in other words, it seems that the STR market was partly saturated, even though the high turnaround (high numbers of novel entries and withdrawals at the same time within identic neighborhoods) might suggest that hosts reacted on regulations, by altering their offers (whereby, it can not be traced if the same estates are offered under a new guise and/or institutional affiliation); in 2020 the number of new entries decreased by half of the 2019 level. The lion’s share of active listings (87%) were comprised of private rooms (47%) and singular properties (40%) with relative stable values since 2015. The remaining share (13%) is marketed through professional and semi-professional providers with two or more properties. It can be stated that professional and semi-professional listings only account

for a relatively small share of the market which is not rising, unlike current trends in other European cities (e.g. see *Cocola-Gant et al. 2021* for Lisbon and *Balampanidis et al. 2019* for Athens). At the same time, those professional hosts tender not only bigger estates on average, but are also more efficient in letting them out in terms of both frequency of bookings and revenue generation. For example, hosts with five or more properties recorded double the frequency of annual bookings (33 vs. 17) and annual revenues (13,843 vs. 7,233 Euro) against hosts with only one property.

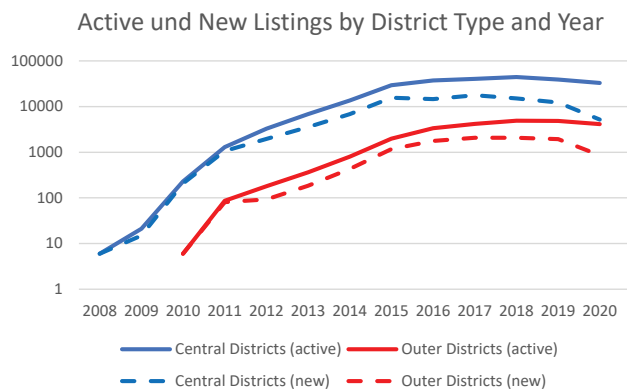


Fig. 1 Number of active and new AirBnB listings by districts type, 2008-2020 (lg-scale). Source: own elaboration

3. Spatial structure and evolution of the STR market

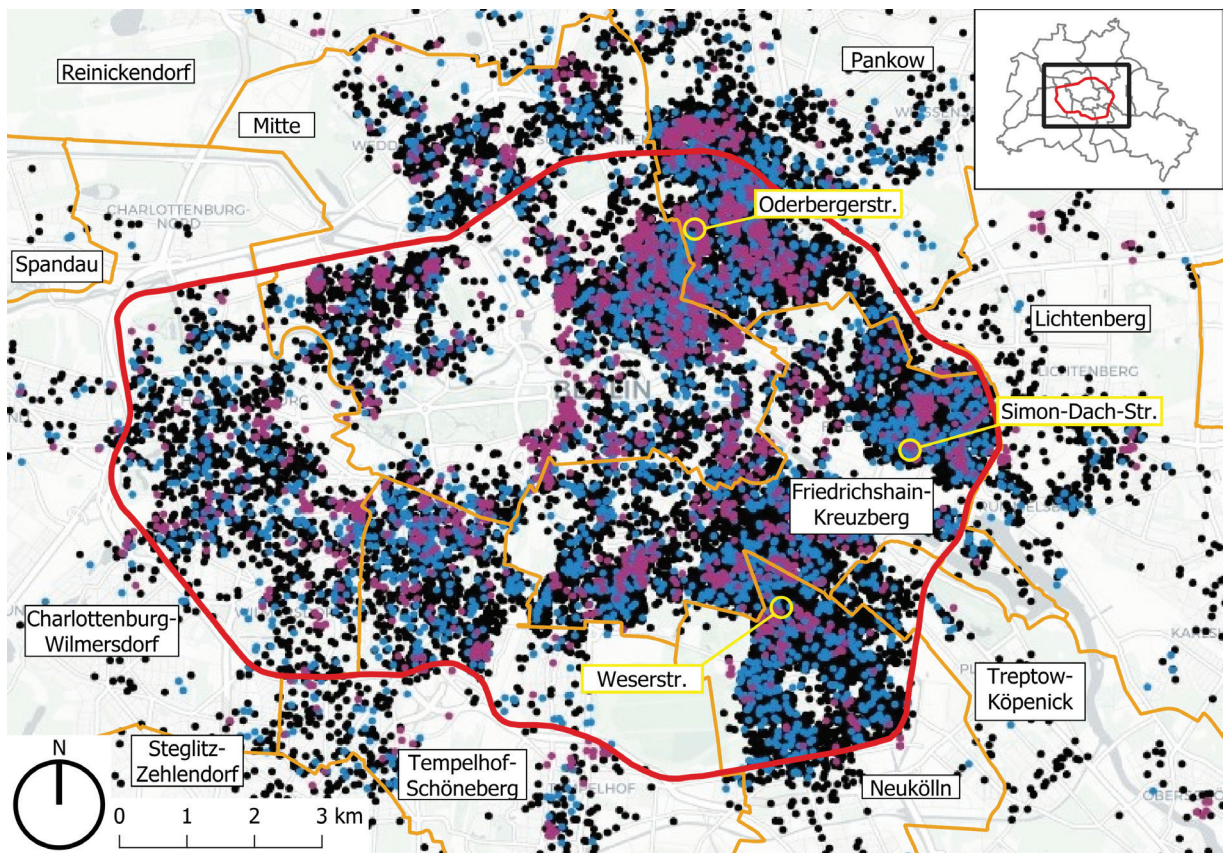
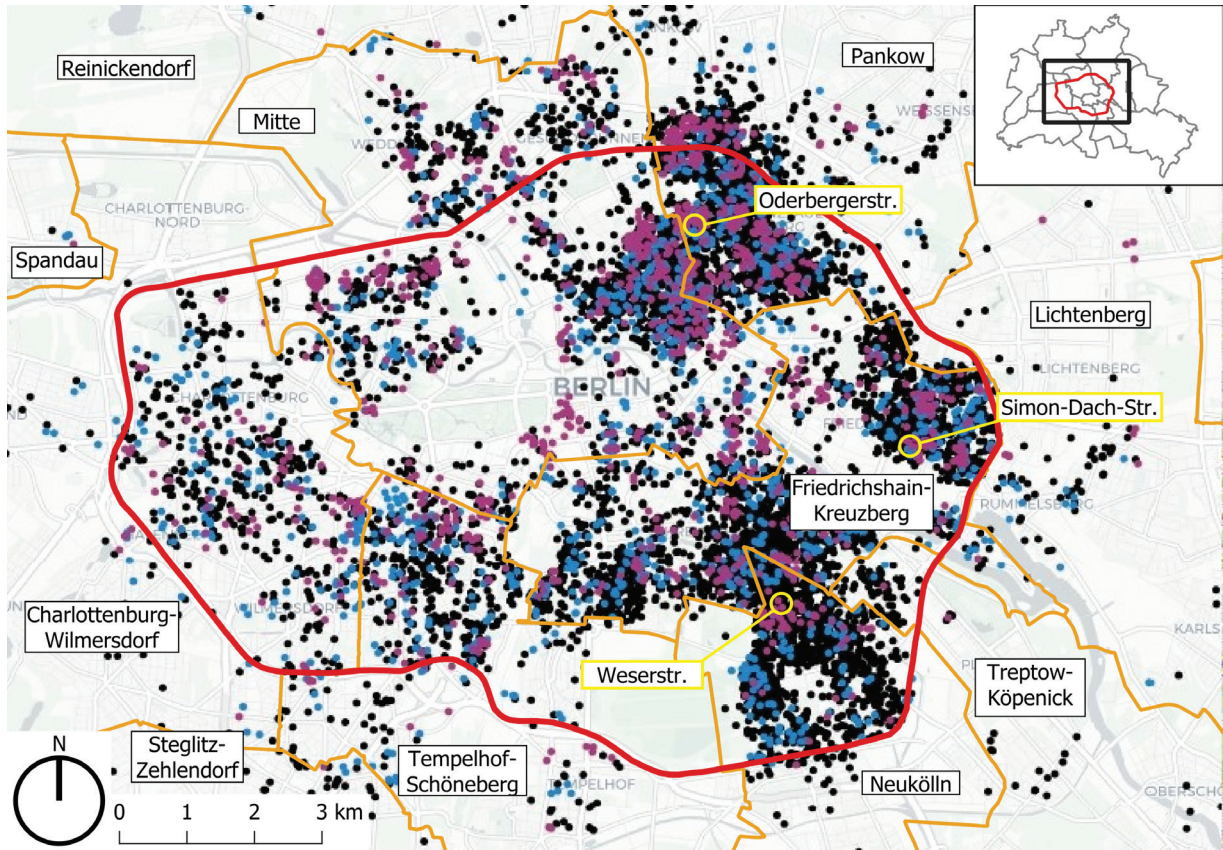
Considering the spatial distribution of STR locations between 2008 and 2020 in general, and between 2014 and 2020 in particular (Table 1, Figs. 2-5), the following big picture can be identified based on descriptives. Hereby, we make two spatial distinctions where we trace both structure and evolution: (1) central districts (merely inside the dog head shape S-Bahn circular line) vs. outer districts; (2) differentiating on the district level.

Let us take a look at the spatial structure first. Almost 90% of all offered and active listings have their location within the central districts tenement house quarters (*Gründerzeitviertel*) surrounded by the S-Bahn-circle line (*Ringbahn*) (Figs. 2-5). It is noticeable that within these central city districts, STR offers are largely concentrated within a building stock in Wilhelminian style, and not in parts where (socialist) large prefabricated housing estates of the 1950s to 1980s are prevalent. In 2018, the four inner city districts (*Bezirke*) of Friedrichshain-Kreuzberg (24%), Mitte (21%), Pankow (15%) and Neukölln (15%) were responsible for three-fourths of all (active) listings and record the highest densities, followed by the former West-Berlin inner city districts of Charlottenburg-Wilmersdorf (8%) and Tempelhof-Schöneberg (7%)¹. The remaining 10% were located on the outskirts. Those four inner city districts were the pioneers within AirBnB listings, lead rankings in spatial concentration (e.g. *Stors and Kagermeier 2017; Duso et al. 2020; Reif 2022*), both in stock and new entries. As a means for spatial concentration², we relate active listings to the housing stock on the district level, stating that roughly 5% of the top four inner city districts overall housing stock is marketed, whereas only 0.5% of the overall housing stock is available for STR in the outer districts on average. If we relate cumulated numbers of listings offered to the overall housing stock on the district level, every tenth flat was listed on AirBnB in the top four inner city districts with Friedrichshain-Kreuzberg as the leader where roughly even every sixth flat was subject to STR. We do expect even much higher spatial densities on the sub-districts (LOR-level)³ both regarding active and overall listings by the factor of three to the above mentioned numbers (see also *Skowronnek et al. 2015*, who identified the following streets with the highest numbers of AirBnB listings: *Weserstr.* (Neukölln), *Simon-Dach-Str.* (Friedrichshain-Kreuzberg) or *Oderberger Str.* (Pankow) that represent well known gentrified and touristified hotspots in those LOR).

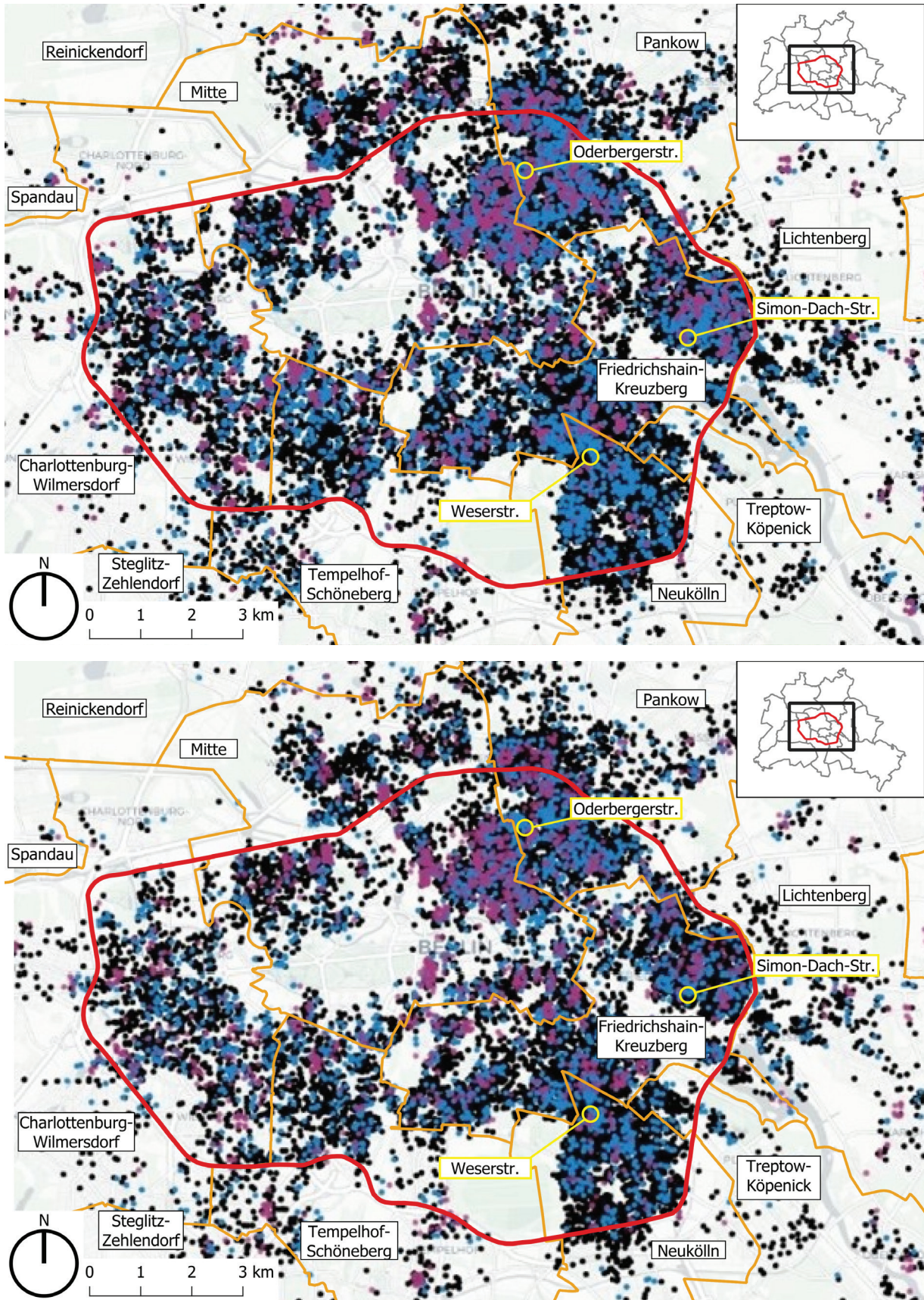
Table 1 Distribution of active and new AirBnB listings by districts type, 2008-2020 (in %). Source: AirDNA data, processed by the authors

Area	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Central Districts (active)	100.00	100.00	97.45	93.73	94.78	94.91	94.48	93.69	91.79	90.70	89.97	88.91	88.89
Outer Districts (active)	0.00	0.00	2.55	6.27	5.22	5.09	5.52	6.31	8.21	9.30	10.03	11.09	11.11
Central Districts (new)	100.00	100.00	97.20	92.97	95.49	95.03	94.05	93.02	89.25	89.52	87.89	86.39	85.75
Outer Districts (new)	0.00	0.00	2.80	7.03	4.51	4.97	5.95	6.98	10.75	10.48	12.11	13.61	14.25

The spatio-temporal dynamics of the short-term rental market in Berlin (2008-2020) – The case of AirBnB



The spatio-temporal dynamics of the short-term rental market in Berlin (2008-2020) – The case of AirBnB



Figs. 2-5 Spatial distribution and evolution of active Airbnb listings in central districts in Berlin, 2014, 2016, 2018 and 2020. Source: AirDNA data, processed by the authors

When tracing the spatial evolution of the STR market, again the above mentioned four inner city districts were the pioneers within AirBnB listings, lead rankings in spatial concentration (e.g. *Stors and Kagermaier 2017; Duso et al. 2020; Reif 2022*), concerning both stock and new entries. Depending on the year, they unite approximately 70-85% of all active accommodation with decreasing numbers, especially concerning overall new entries from 2017 on. The identified patterns of spatial diffusion are originating from the above mentioned four city districts with the strongest base (stock of active listings) and impulses (amount of new entries). In a second step, we observed a smaller wave with rising numbers in the former inner city districts of West-Berlin (Charlottenburg-Wilmersdorf and Tempelhof-Schöneberg) and finally an adaptation of late-comer districts on the outskirts. Interestingly, these waves and their impulses – having persistent spatial origins – are bound to tourist and visitor's preferences and are rather not sharing "the caravan passes by" characteristics of moving from gentrified towards gentrified districts like the conventional residential gentrification and its spatial spiral patterns as modelled by *Holm (2014)* and *Döring and Ulbricht (2018)*. In an attempt to understand the AirBnB role in gentrification, we suppose that the touristification processes (reflected upon long-term STR market spatial structures and concentrations) might follow the spatial patterns of previously unfolded classical residential gentrification processes – albeit with slower pace and impact on outskirts – as research, tracks and listings of location off the beaten path exemplify (e.g. *Gyódi 2019*). *Figure 1* and *Table 1* show this slow diffusion by distribution of active and new AirBnB listings between 2008-2020 contrasting central and outer districts. We see the time lag and the discrepancy between offered and active listings by the factor ten between central and outer districts.

4. Discussion and conclusion

This paper provides a short overview of the spatio-temporal emergence, diffusion and quantitative attributes of the STR market in Berlin by means of AirBnB. It can act as a starting point for various purposes when tracing spatial trajectories of touristification, gentrification, private-led urbanisation and pressures on land rents that are often fueled by STR-mediated platforms. However, unlike observed processes of touristification (*Stors and Kagermaier 2017*) and gentrification (*Holm 2014*), the diffusion

is not so strongly pronounced in the outskirts due to spatial persistence of visitors and tourists and the temporary nature of their residence. Our research confirms findings about the spatial concentration of STR listings in predominantly tenement housing quarters (*Duso et al. 2020; Reif 2022*), as in other European metropolises (*Hübscher and Kallert 2023*) and indirectly the largely modest impact that regulations have upon STRs, also as the market proved to be resilient (by using alternative techniques, novel listings, other affiliations etc.) in the long run, even in cities which implemented strict regulatory frameworks like Berlin (*Von Briel and Dolnicar 2020*). Moreover, we point to the fact that STRs might solidify central district gentrification through their spatial concentration and recurring development patterns. Hereby, we complement also other insights that indicate towards gentrification through the presence of STRs by increasing average monthly rents neighborhood with AirBnB listings (*Duso et al. 2020*) and touristification (*Stors and Kagermaier 2017*) in Berlin and elsewhere (*Wachsmuth and Weisler 2018*). Generally, it will be interesting to shed some light upon the theory and empirics of STR (on a sub-district level) and their relationship towards touristification and/or gentrification. The following questions have been recently posed by scholars: Which came first, the gentrification or the AirBnB? Or what can gentrification theory learn from AirBnB and vice versa (*Merment 2022; Rabeie-Dastjede et al. 2022*)? Where can we detect the STR gentrification driven hotspots? Or space invaders? How do AirBnB contribute to the unfolding of touristification processes (*Neuts et al. 2021*)? Additionally, a preliminary outlook upon the available data for 2020 and 2021 for Berlin showed that only after the advent of COVID-19, amounts of novel entries and overall stock of STR listings significantly dropped as demand heavily lessened. These effects and impact of the pandemics need to be investigated further, both on the market in general, and the spatial accentuation and consequences in particular (*Dagkoulis-Kyriakoglou et al. 2022; Llana Hesse and Raya Vilchez 2022; Sequera et al. 2022*).

Notes

¹ It has to be mentioned that the districts Pankow, Neukölln, Tempelhof-Schöneberg and Charlottenburg-Wilmersdorf have also neighborhoods outside of the dog head shape S-Bahn circular line to various extents. Therefore, the numbers for central and outer districts in *Table 1* are ap-

proximated, following the assumption – also evidenced by the de facto observed distribution within those districts – that most of the listings are within the circular line (see *Figs. 2-5*).

² The latter was already approached differently by descriptive statistics e.g. Airbnb listings per 1,000 inhabitants (e.g. *Stors and Kagermeier 2017: 6*) or rentals / qkm (*Duso et al. 2020: 19*), or explanatory statistics, e.g. (Global) Moran's I-Index (*Reif 2022*) basically confirming our results. Another way of depicting these concentrations can be implemented via location coefficients or methods like shift-and-share analyses.

³ By LOR-level, we mean a sub-district level called *lebensweltlich orientierte Räume*; this category represents 'areas oriented to the everyday living environment' and provides a spatial basis for planning, forecasting and monitoring demographic and social developments in Berlin. The object is to depict homogeneity in terms of everyday living environments and built environments while at the same time maintaining comparability of planning area units. Hence, this category is very appropriate for such purposes (*Senatsverwaltung für Stadtentwicklung, Bauen und Wohnen 2023*).

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The spatio-temporal dynamics of the short-term rental market in Berlin (2008-2020) – The case of AirBnB

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