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TAMING AIRBNB LOCALLY: ANALYSING REGULATIONS IN AMSTERDAM, BERLIN AND LONDON

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ABSTRACT

European cities have responded differently to the growing number of short-term rentals (such as Airbnb) and proposed a variety of regulations, although little is known about their efficiency. This paper contributes to filling the gap by analyzing both policy documents and spatial distributions of Airbnb listings between 2015 and 2020 using Amsterdam, Berlin, and London as case studies. We also compare the results with those of nine other European capitals. Our results show that cities follow highly individualized approaches. According to the strictness of each regulation, we see different intensities in the growth (and drop) of Airbnb listings, the share of multi-hosts, and the share of apartments withdrawn from the regular housing market. There is also a spatial dispersion of listings from the center to the periphery. Our numbers insinuate that dynamically changing regulations force hosts to adapt continuously—which tames an uncontrolled proliferation, but more research is necessary.

Key words: Short-term rentals; Airbnb; Regulation; Amsterdam; Berlin; London

INTRODUCTION

Short-term rentals (STRs), such as those arranged through Airbnb, have revolutionized the way we travel. Since its foundation, Airbnb was accompanied by the apparently romantic narrative of ‘authentic accommodations’ (Nieuwland & van Melik 2018, p. 812) and sharing your home with others. Today, little is left of this sustainable concept in STRs that might have prevailed one decade ago (Oskam 2019). Airbnb, the largest of these platforms, disrupts not only the tourism industry (Geissinger *et al.* 2020), but also everyday life in neighbourhoods (Vives-Miró & Rullan 2017).

The massive proliferation of STRs worldwide contributes to phenomena such as gentrification (Wachsmuth & Weisler 2018) and the commodification of housing (Gutiérrez & Domènech 2020). This proliferation is also

interpreted as one consequence of the ‘regulatory failure’ in the neoliberal city (Brenner *et al.* 2010, p. 218). Hence, it comes as no surprise that a growing number of cities intend to regulate STRs, despite the observed liberalization of housing markets fuelled by many states (Cocola-Gant 2016, p. 7). However, the impacts of these regulations often do not meet the expectations (Guttentag 2015, pp. 1202–1203; Espinosa 2016, pp. 607–609). In addition, regulations on STRs do not receive the same scientific interest compared to other aspects related to STRs (Guttentag 2019, p. 819), although in recent years, an increasing number of contributions is observed (see for example Von Briel & Dolnicar 2020; Chen *et al.* 2021).

COVID-19 might have attenuated some of the immediate impacts of Airbnb in cities, as the pandemic has ‘disrupted the disruptor’ (Dolnicar & Zare 2020, p. 1) due to travel

restrictions and lockdown protocols. There is the hope that perceiving this current crisis as an opportunity might shift housing units back to the regular housing market, but it is too early to confirm and there is no empirical evidence (Armas-Díaz *et al.* 2021a, p. 13).

Hence, further research on regulating STRs is necessary. In this paper, we pursue two objectives. First, we explore the regulatory approaches of 12 European cities (see Table 1). We chose these cities to broaden the systematization on regulation proposed by Nieuwland and Van Melik (2018), who compared five European cities with six American cities based on data until 2017. Our study updates these findings and develops the comparison further within the European context. Apart from these five European cases, we added seven cities to achieve a broad range of different urban settings (with regard to nation-state, population numbers, socio-economic parameters, etc., see Table 1). Additionally, we selected cities with different regulatory approaches, which was ensured by conducting a preliminary analysis. Half of these cities form part of a network that requested the European Commission to set up a 'new legislative framework' (Eurocities 2020, p. 2) that makes STR platforms 'liable for fulfilling their obligations' (*ibid.*). We interpret this call as a certain willingness of these cities to regulate. Both for the preliminary and final analyses, we collected press releases and policy documents (see Section 3, methodological framework).

Second, we investigate the impacts of these regulations by analysing the geographies of Airbnb listings (as the largest STR platform) from 2015 to 2020 in Amsterdam, Berlin and London. We retrieved data from Inside Airbnb,¹ a web-scraping platform, and analysed the spatial and structural development of Airbnb listings. Amsterdam, Berlin and London represent three out of the top seven European cities with the highest numbers of Airbnb listings in 2020, and half of all listings within this group (Statista 2021a). The selection of these cities was based on the hypothesis that they all apply very different coping strategies (Nieuwland & Van Melik 2018, p. 816). In addition, data availability for each of the three cities is appropriate.

Inspired by comparative urban research, we seek to identify similarities and differences

(Nijman 2007) in how the different cities regulate STRs. Our comparison of these cities refers to 'most different systems' (Pickvance 2001, p. 14; with regard to how they regulate STRs). By applying such a 'variation-finding approach' (Aguilera *et al.* 2019, p. 1694), we take up the existing diversity in coping strategies in (European) cities and the small amount of 'comparative research to explain this diversity' (Aguilera *et al.* 2019, p. 1689). Hence, comparing regulations in 12 cities will (i) contribute to a further systemizing of existing regulatory approaches to STRs—a field, that is regarded as unsystematic (Vinogradov *et al.* 2020, p. 2). On that basis, exploring the spatiotemporal characteristics of Airbnb listings in three selected case studies helps (ii) to understand the impacts of these regulations.

This paper is structured as follows. Section 2 provides an overview of the existing research about regulating STRs. Section 3 proposes the methods to achieve the research objectives. Section 4 presents the results and puts them into context. The last section draws a conclusion.

PLATFORM CAPITALISM: TAMING OR LETTING?

Why regulate? – Since the global financial crisis of 2008 (Srnicek 2017), platform capitalism has penetrated different areas of the economic system. Platform capitalism refers to 'intermediaries (companies) acting as matchmakers in multisided platforms' (Papadimitropoulos 2021, p. 249). The fact that the regulatory frameworks in many cities were not prepared for these new phenomena helped platforms to have such success in the first place (McNamara 2015). As for STRs, it was through American jurisprudence that these regulations started to be analysed (Gottlieb 2013). Since then, the number of studies on regulations has increased considerably, as Guttentag's literature review reveals (2019).

Differentiating between the motivations to regulate is a first step to approach the issue. Nieuwland and Van Melik point out that 'most cities feel the urge [...] to balance the interests of visitors and local residents/businesses' (2018, p. 814). This implies an aim to

Table 1. Context of case cities. *Own elaboration.*

	Amsterdam	Berlin	London	Athens	Barcelona	Copenhagen
City Population (2020) ^a	872,922	3,669,491	8,866,541 (2018)	664,046 (2014)	1,636,762	626,508 (2019)
Total number of housing units ^b	441,467	1,968,315	3,592,000	427,825 (2011)	682,1280	297,469 (2012)
Percentage of home-ownership in % ^c	31	15	49	68 (2013)	72	29
Percentage of privately rented housing in % ^c	29	78	29	35	26	52
Average rent per square meter in € (2020) ^d	18.7	7.3	20.1	8.86	19.6	19
Average monthly net salary (after tax) in € ^e	3092	2855	3539	801	1578	3266
Rate of unemployment in % ^f	4	6	5	21 (2011)	9	6 (2012)
Number of tourists (bednights) in mio. 2019 ^g	18	34	85	5.3 (2011)	20	9.0 (2018)
Number of Airbnb listings (2020) ^h	18,546	20,255	77,324	9430	19,681	8756
participation in the EU protest letter ^j	Yes	Yes	Yes	Yes	Yes	No
	Dublin	Lisbon	Madrid	Paris	Rome	Vienna
City Population (2020) ^a	544,107 (2018)	506,654 (2019)	3,223,334 (2018)	2,240,621	2,808,293	1,944,910 (2021)
Total number of housing units ^b	239,605 (2011)	323,915	1,480,099	1,312,426	1,137,391 (2011)	918,255
Percentage of home-ownership in % ^c	63	75	73	33	73	23

(Continues)

Table 1. (Continued)

	Dublin	Lisbon	Madrid	Paris	Rome	Vienna
Percentage of privately rented housing in % ^c	24	23	20	43.9	24	17
Average rent per square meter in € (2020) ^d	13.2	10.8	18.1	27.8	13.4	9.8
Average monthly net salary (after tax) in € ^e	2942	1007	1633	2912	1478	2355
Rate of unemployment in % ^f	16 (2011)	12 (2011)	11	13 (2017)	11 (2018)	12 (2014)
Number of tourists (bednighus) in mio. 2019 ^g	15	14	21	52	29	19
Number of Airbnb listings (2020) ^h	7923	11,636	20,411	60,031	28,246	12,084
Participation in the EU protest letter ⁱ	No	No	No	Yes	No	Yes

^aEurostat (2021a); UN Data (2021).

^bEurostat (2021b).

^cKnight Frank (2018); European Commission (2021); København Kommune (2021).

^dDeloitte Czech Republic (2019).

^eNumbeo (2021).

^fEurostat (2021c).

^gStatista (2021b).

^hStatista (2021a); InsideAirbnb (2021); these are total numbers, which means that inactive listings are not excluded Nui20 (2021); Athens Social Atlas (2015); Stadt Wien (2021a).

ⁱEurocities (2020).

mitigate the various impacts on neighbourhoods, considering that, for example, Airbnb is associated with rising rents (Sheppard & Udell 2016) and community conflicts (Gurran & Pibbs 2017, p. 85). Apart from that, the hotel industry demands to regulate platforms such as Airbnb to enable a level playing field (Mody *et al.* 2017, p. 2378).

Adding complexity to the problem – Regulating STRs is an objective that is not only complex, but also conflictive, and the existing measures often do not work as expected (Guttentag 2015, pp. 1202–1203; Espinosa 2016, pp. 607–609). Hence, ‘there is no evidence upon which to draft policies’ (Quattrone *et al.* 2016, p. 1385). This is due to a set of aspects that complexifies the aim of regulating STRs. Scanning through the literature, we identified at least four areas in which to cluster these difficulties, namely (i) legal, (ii) economic, (iii) technical and (iv) political aspects.

First, from a legal perspective, complexity is added due to the different levels of jurisdiction that are involved in the legislative procedure. Although impacts of STRs are seen locally, there might be a regional, national or even supra-national jurisdiction with different objectives (Joppe 2019, p. 257). Apart from that, there is a strong discussion about the fine line between regulation and the reduction in personal rights (e.g. the right of ownership), which makes the regulations vulnerable in lawsuits (Jefferson-Jones 2015, p. 564).

Second, considering the economic point of view, STRs are doubtlessly a driver of urban development, and contribute to the local economy (Quattrone *et al.* 2016, p. 1392), such as those stakeholders providing ‘rent, food and beverages, transportation’ (Gold 2019, p. 1587). Consequently, policymakers try not to cut-off the positive effects, such as tax revenues (Lee 2016, pp. 244–245).

This leads to the political dimension. As different stakeholders profit from STRs, there is a growing number of lobby groups ‘mobilised and coordinated to advocate for favourable regulation’ (Yates 2021, p. 18), exemplified by Airbnb’s Home Sharing Clubs (*ibid.*). These lobby groups successfully influence

the legislative procedure on the local and national levels, as has been shown in the case of the United States (Guttentag 2015, pp. 1201–1202).

Lastly, technical issues remain that make efficient regulation of sharing platforms difficult. This is because decisions about regulations ‘must be taken in the state of imperfect information’ (Pawlicz 2019, p. 398), because platforms such as Airbnb do not provide detailed data. The existing doubts about the efficiency of regulations go back to the uncertainty over who is actually going to be affected (private vs professionalized hosts; Armas-Díaz *et al.* 2021a, p. 6).

How to regulate? – There is a large variety of approaches to regulate STRs. Nieuwland and Van Melik classify these regulatory frameworks by specifying their strictness. They differentiate between ‘full prohibition, the laissez-faire approach, and the limitation’ (2018, p. 814). Others even see four categories: liberal, moderate, moderate-collaborative and protective (Von Briel & Dolnicar 2020, p. 3). On the contrary, Jefferson-Jones (2015, p. 564) focuses on labelling the measures and attaching categories to them. The author categorizes quantitative restrictions (caps), proximity restrictions, operational restrictions, licensing requirements and full prohibition. Table 2 summarizes some of the most observed instruments to regulate STRs, dividing them into quantitative, spatial and qualitative measures.

Based on the above-mentioned multiple approaches, our first aim is to explore, how the 12 cities selected regulate STRs. Although some authors confirm the success of these regulations (Adamiak 2019, p. 5; Guttentag 2019, p. 19), others observe the opposite and question their effectiveness (Von Briel & Dolnicar 2020, p. 5). Hence, the second aim of this paper is to evaluate the impact of these regulations. Here, we put the focus on Airbnb as the largest STR platform. We do so by means of spatial and temporal comparisons considering the effects on the supply side of the Airbnb market. We will focus on Amsterdam, Berlin and London

Table 2. Selection of typical instruments, and their objectives and limitations. *Own elaboration.*

Instruments	Objectives	Limitations	Sources
Complete ban	Eliminate Airbnb-listings from a city or a certain neighbourhood	Loss of positive effects of STR, taxes etc.	Nieuwland and Van Melik (2018) p. 816; Jefferson-Jones (2015, p. 564)
Quantitative regulations			
Limit the number of days or max. Guest numbers or max. Number of rentals	Protect the availability of housing units for long-term rentals	Monitoring necessary, but costly	Guttentag (2015, p. 0.9); Oskam and Boswijk (2016, p. 30); Frenken and Schor (2019, p. 131)
Limit the amount of entire dwellings, but permit individual bedroom	Protect the availability of housing units for long-term rentals	Monitoring necessary, but costly	Martínez Nadal (2019, p. 43); Oskam and Boswijk (2016, p. 30); Frenken and Schor (2019, p. 131)
Taxation	Participate from the benefits; reduce the number of listings; level playing field in hospitality industry	No precise instrument to manage to impact of STR	Guttentag (2015, p. 10); Kagermeier <i>et al.</i> (2015, p. 15)
Spatial restrictions			
Limit the number of STRs per multi-family house; permission of owner associations	Find balance, integrate local owners	Monitoring necessary, but costly	Martínez Nadal (2019, p. 44); Frenken and Schor (2019, p. 131)
Relative proportion between regular flats and Airbnb listings in a neighbourhood	Contributes to the legal differentiation between private and commercial offers	Monitoring necessary, but costly	Jefferson-Jones (2015, p. 565); Frenken and Schor (2019, p. 131)
Spatial distance between two Airbnb listings	Might prevent additional entrants into the Airbnb market	Monitoring necessary, but costly	Jefferson-Jones (2015, p. 565)
Qualitative restrictions			
Qualify the listings, e.g. hygiene and security standards	Customer protection, level playing field in hospitality industry	Monitoring necessary, but costly	Jefferson-Jones (2015, p. 565); Kagermeier <i>et al.</i> (2015, p. 15)
Licenses/registration numbers	Increase the cost for the process; monitoring for city administrations	Time and effort for administration	Martínez Nadal (2019, p. 1); Jefferson-Jones (2015, p. 564)

as case studies because they have all experienced the negative impacts of STRs (Von Briel & Dolnicar 2020, p. 1). However, they still represent different regulatory regimes, which means they address STRs differently from a law-giving perspective (Nieuwland & Van Melik 2018, p. 817).

Neglecting other factors that influence the proliferation of Airbnb listings, we suppose that in cities where regulations have been tightened, we will either see a decreasing number of listings or at least a slower increase compared to other cities. We also expect spatial bans to increase the number of listings in surrounding districts, even if other regulations affect the whole city (Valentin 2021, p. 158). In addition, quantitative restrictions (such as limiting the amount of offers per host, see Table 2) are expected to increase the diversification of the host structure (more hosts with less listings).

METHODOLOGICAL FRAMEWORK

Qualitative analysis – First, we conducted a document analysis to review existing regulations of STRs systematically, and we interpreted the material with a qualitative-interpretative approach (Mayring 2016). Due to their comparatively high validity, legislative documents and press releases at the federal, state and local levels were used (see Table 3). The search was carried out via the Google search engine and the homepages of the respective institutions. Frequently occurring search terms were ‘Amsterdam/Berlin/London,’ ‘short-term rental/Airbnb’ and ‘law/regulation/restrictions.’ We searched in English and German. Documents that were not in these languages were translated via the DeepL translation website. Although there may be discrepancies in content due to translation, we argue that the advantages of assessing a wide range of European cities outweigh the disadvantages.

We also examined the digital reporting from national to local newspapers via the Google News service, including documents from 2009 to 2021. This helped to understand the local situation and possible development tendencies within each city.

To compare the regulatory measures, we propose the following set of indicators, which is based on the systematization and references presented in Table 2: type of regulation (ban/restriction), taxation, level of regulation (state/province/municipality), maximum fine, registration/permit requirements and bearer of legal responsibility (platform/host/guest). In addition, we differentiated regulations for private rooms, primary residences and secondary residences.

Quantitative analysis – Second, we aimed to evaluate the impacts of these regulations on the geography of STRs in Amsterdam, Berlin and London, focusing on Airbnb listings. We did so by using open access data from municipal databases, publications of the tourism and real estate industry, and the platform Inside Airbnb. The analyses were supported by a QGIS geoinformation system (QGIS 2021).

In March 2021, we retrieved city-specific datasets (Amsterdam, Berlin and London) for the period 2015–2020 for the month of August in each year. With regard to the latest dataset from August 2020, one has to question the validity due to the impacts of COVID-19. Hence, we will show how the Airbnb market changed until 2020, and which trends existed prior to COVID-19, but we will refer to the year 2019 where adequate.

We examined whether municipal changes occurred in the structure of Airbnb listings (such as price, hosts, type of apartment, average length of stay, etc.), but also whether possible developments could be attributed to the regulatory interventions. We define ‘professional hosts’ as those stakeholders ‘who use one or more apartments or homes only for rent’ (Adamiak 2019, p. 3).² Following Smigiel *et al.* (2020), we then excluded inactive listings, that is, those that did not receive a rating in the previous year or were not offered for the following year.

Since we could not extract full information on the professionalization of platform users from the raw data, we followed the calculations of Wachsmuth and Weisler (2018). According to their approach, a residential space that is rented via STR platforms for a maximum of

Table 3. Regulations in selected case study cities. *Own elaboration.*

	Amsterdam	Berlin	London	Barcelona	Vienna	Madrid
Since	2020	2018	2017	2020	2019	2019
Type of regulation (ban/restriction)	Partial ban + restriction	Restriction	Restriction	Partial ban + Restriction	Restriction	Restriction
Taxation	Yes	Yes	Yes	Yes	Yes	Yes
Level of regulation (city/country/state)	City	City	City	City	City	City
Liability (Airbnb/host/guest)	Host	Host	Host	Host, Airbnb	Host	Host
Maximum fine in Euro	20,750	500,000	20,000	600,000	21,000	*
Registration	Yes	Yes	No	Yes	No	Yes
Measures in detail: Listing of private rooms	Yes	Yes	Yes	Yes, but 1 year suspended	Yes, if owner of the apartment no, if primary residence yes, if secondary residence	Yes
Permission for private rooms	Yes	no, if <50% of the apartment	No	Yes	Yes, if owner of the apartment no, if primary residence yes, if secondary residence	No
Daily limit for listing private rooms	No	No	No, if owner is in the apartment	No	No	90 days
Apartment (main residence) listing	Yes	Yes	Yes	Yes	Yes, if not in residential zone, no rental apartment, no community building, no objection of other owner in house	yes
Permission for main residence	Yes	Yes	Only from 90 days of renting	Yes, incl. inspection, approval, cataloguing	No	From 90 days with licence
Daily limit for listing of main residence	30 days	No	90 days	No	No	90 days, afterwards licence

(Continues)

Table 3. (Continued)

	Amsterdam	Berlin	London	Barcelona	Vienna	Madrid
Apartment listing (secondary residence)	Yes	Yes	Yes	Yes	Yes, if not in residential zone, no rental apartment, no community building, no objection of other owner in house	Yes
Approval of secondary residence	Yes	Yes	Only from 90 days rental	Yes	No	From 90 days with licence
Daily limit for second home	30 days	90 days	90 days	No	No	90 days, afterwards licence
Sources	Rekenkamer Metropool Amsterdam (2019); City of Amsterdam (2022)	Stadt Berlin (2018); Land Berlin (2013)	The Houses of Parliament (2015); Ferreri / Sanyal (2018)	O'Sullivan (2021)	Stadt Wien (2021b)	Rodriguez-Pina (2019)
Since	2020	2018	2017	2016	2018	2019
Type of regulation (ban/restriction)	Restriction	Restriction	Restriction	Partial ban + restriction	Restriction	Restriction
Taxation	Yes	Yes	Yes	Yes	Yes	Yes
Level of regulation (city/country/state)	Country, city	Country, city	Country	City	Country, city	Country, city
Liability (Airbnb/host/guest)	Host	Host	Host	Host	Airbnb, host	Host
Maximum fine in Euro	*	*	30,000	40,000	12,500 Primary residence; 50,000 secondary residence	10,000
Registration	No	No	Yes	Yes	Yes	Yes

(Continues)

Table 3. (Continued)

	Rome	Copenhagen	Athens	Lisbon	Paris	Dublin
Measures in detail:						
Listing of private rooms	Yes	Yes	Yes	Yes	Yes	Yes
Permission for private rooms	No	No	No	Yes	No	No, if owner in apartment
Daily limit for listing private rooms	No	No	No	No	No	No
Apartment (main residence) listing	Yes	Yes	Yes	Yes	Yes	Yes
Permission for main residence	No	No	No	Yes	No	No, only from 90 days
Daily limit for listing of main residence	No	70 days	No	No	120 days	90 days
Apartment listing (secondary residence)	Yes	Yes	Yes	Yes	Yes, if >1 year	Yes
Approval of secondary residence	No	No	No	Yes	Yes	Yes
Daily limit for second home	No	70 days	No	No	No	No
Sources	Airbnb Helpcenter (2021)	Airbnb (2021)	Ernst & Young (2018)	The Portugal News (2018)	Paris (2020)	Irish Statute Book (2019)

*Missing information for the indicators.

60 days per year and is available on such platforms for a maximum of 120 days per year, can still be regarded as primary residence with a regular residential use. While city administrations propose a different maximum number of days, we suppose that those cities with a stricter regulation (e.g. 30-day rule in Amsterdam; Rekenkamer Metropool Amsterdam 2019) will have more success in decreasing the share of apartments that are exclusively rented out on STR platforms such as Airbnb, compared to less strict regulations (e.g. in London; Ferreri and Sanyal 2018).

Regarding the annual occupancy rate of apartments withdrawn from the housing market, we follow the assumptions made by Smigiel *et al.* (2020, p. 157) and Seidl *et al.* (2017). The authors assume that 50 per cent of guests provide a rating and that there is an average length of stay of 4 days. They base their calculations on these two parameters to estimate the occupancy rate. Concludingly, such assumptions can only be valid to a limited extent.

The significance of our study is also limited as regulations are not the only factor influencing the Airbnb market. Tourist demands and population development (housing as competing function) play a significant role, too. Here, we argue that putting the focus on regulations is still a relevant piece in the puzzle to understand the regulations' effectiveness.

THE REGULATORY APPROACH AS A SUCCESS FACTOR IN DEALING WITH AIRBNB

Regulatory approaches in Amsterdam, Berlin, London and nine other cities – Analysing regulatory approaches in our 12 cities reveals that each municipality has developed its own approach for dealing with STRs (Table 3), there is no one-size-fits-all solution (Gurran & Phibbs 2017, pp. 90–91).

Even so, overarching patterns are certainly noticeable. For example, to legally differentiate commercial and private offerings, half of the reviewed municipalities apply quantitative restrictions on STRs. It is also instructive that no city enforces a complete ban on STRs.

This suggests that despite significant negative effects, the municipalities studied do not want to forgo the undeniably high economic benefits of STRs (Jefferson-Jones 2015, p. 560).

Another strategy is to impose spatial restrictions (Vienna, Dublin, Madrid). This can counteract the STR pressure on central residential neighbourhoods, as highlighted by Quattrone *et al.* (2016, p. 1392), without depriving less affected areas of benefits.

At the time of Airbnb's founding in 2008, Amsterdam (and Berlin) had legislation that did not explicitly include the business practices of digital STR platforms. Von Briel and Dolnicar (2020, p. 2) refer to this form as 'gap' regulation. Amsterdam, in particular, has gone from being 'Europe's first sharing city' (shareNL 2015) to one of the most restrictive municipalities in Europe in just a few years (Figure 1). In 2014, there was a temporary stop to approve new STRs and a municipal task force to identify illegal listings was established (Dredge *et al.* 2016, p. 24). In the following years, the regulations have been tightened. From 2016 on, primary and secondary residences were allowed to be rented out for a maximum of 60 days per year, which was reduced to 30 days in 2018 (Dredge *et al.* 2016, p. 24; Rekenkamer Metropool Amsterdam 2019). Furthermore, the rental of an entire apartment, but also a private room, requires an official permit. Concerning the rental of private rooms, only a limited number of offers will be allowed per district. In addition, the rental of entire residential units in the particularly affected Old Town districts of Burgwallen-Oude Zijde, Burgwallen-Nieuwe Zijde and Grachtengordel-Zuid was banned in July 2020. However, a court ordered to lift the ban in March 2021 (City of Amsterdam 2021).

As Table 3 illustrates, Amsterdam's jurisdiction is strict, particularly compared to other European metropolises. Although differences in the content of the legislation are evident, the ban-like measures in Amsterdam, Barcelona and Madrid serve the same overarching purpose, namely, to alleviate tourist pressure on particular neighbourhoods (Nieuwland & Van Melik 2018, p. 5).

There are divergent opinions about how to interpret Berlin's so-called 'Law on the Prohibition

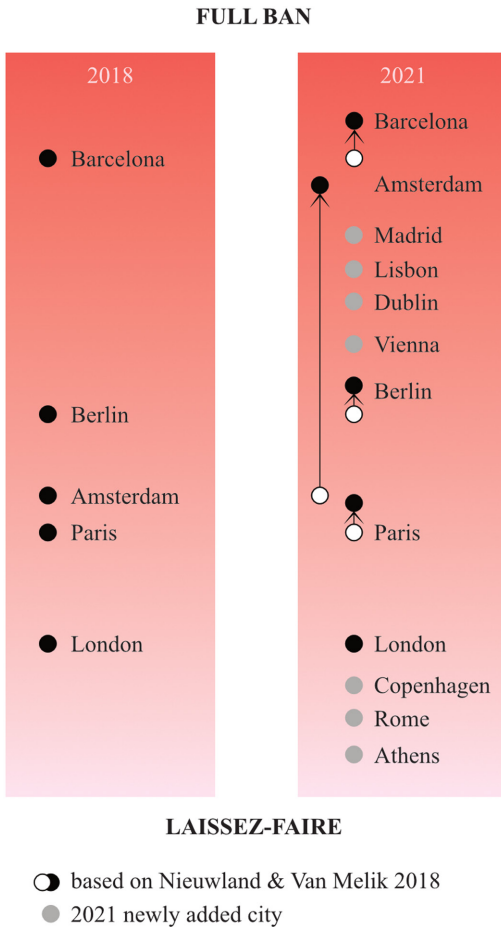


Figure 1. Evolution of restrictions (To assess this evolution, we compared the restrictions discussed by Nieuwland and Van Melik [2018] with the current status quo [Table 3] in European cities in 2021 compared to Nieuwland and Van Melik (2018).

of the Misappropriation of Residential Space’, which was passed by the city’s Senate in 2014. Von Briel and Dolnicar (2020, p. 3) and Apur (2018, p. 11) speak of strict measures that have been tightened over the years, while Busch (2019, p. 39) sees a certain liberalization due to 2018’s novel. Cassell and Deutsch regard Berlin’s regulations as ‘weak but [they] were improved with the latest amendment’ (2020, p. 12).

Key element of 2014’s law is the necessity to obtain a permit to do short-term renting. There was a transition period saying that until May 2016, existing listings were not

affected (Duso *et al.* 2020, p. 6). In April 2018, this law has been updated. Now, a registration is mandatory. Hosts are allowed to rent out their (primary) residence under certain circumstances, for example, if they are absent (Duso *et al.* 2020, p. 6). Apart from that, it is also allowed to rent an apartment as STR if the rented parts are less than half of the total space, and in this case no permit was required, but still a registration number (Busch 2019, p. 39). Secondary residences can be used as STR for less than 90 days per year (Duso *et al.* 2020, p. 7).

We regard the regulation’s evolution in Berlin as a certain refinement, but also interpret the new rules and fines in case of violation (max. of 500.000 euros) as strict (Busch 2019, p. 39; compared to other cities in Table 3). This is also because the public authorities founded a task force with 30 employees controlling local STRs (Senate Department for Urban Development, Building and Housing 2016). These measures are intended to reduce the influence of purely commercial operators on the housing market and hence protect affordable housing. Vienna and Dublin follow a similar goal. As we retrieved data in 2015 and compared it to 2019 and 2020, we expect to see the effect of Berlin’s regulation in our data (such as a slower growth of listings compared to other cities). At the same time, the observed dissensions within the academic discussion about Berlin’s regulations make us expect rather ambiguous empirical results, too.

Compared to Amsterdam and Berlin, London has by far the most liberal jurisdiction. London’s city administration started with a comparatively strict and ‘protective’ (Von Briel & Dolnicar 2020, p. 4) legislation shortly after STR platforms such as Airbnb launched their activity. After that, further deregulation and cooperation with the platform were observed, with the objective to promote the sharing economy in the city (Ferreri & Sanyal 2018, p. 3362).

Implementing the nationwide Deregulation Act in 2015, the Greater London Authority pushed for increased self-regulation by the platform while liberalizing its use. Critics such as Interian (2016, p. 159) doubt the effectiveness, while others are

optimistic about the potentially high benefits for both sides (Li & Biljecki 2019, p. 80). On that basis, Von Briel and Dolnicar define London as ‘end-run city’ (2020, p. 3), and regulations in London did not change fundamentally since then (Figure 1).

The Deregulation Act includes a quantitative restriction, and determines that below an annual maximum rental period of 90 days, no permission to change the use is needed (The Houses of Parliament 2015, p. 37; London Government 2021). The Airbnb platform automatically limits the offering of entire homes in London to these 90 days, if the host does not present a special permit (Airbnb 2022). Private rooms can be rented out for an unlimited period, provided that landlords are present on the residential property (London Government 2021). In addition, the Greater London Authority cooperates closely with Airbnb, as one of the STR platforms, using an agreement (Woolf 2016). The company itself agreed to control the abundance by the laws (Government Digital Service 2022), such as the above-mentioned maximum rental period. The intention here is to maintain quality of living for residents. Copenhagen, Rome, Athens and to some extent Paris fall into the same category. Based on the liberal approach in London, we do not expect the number of Airbnb listings to decrease. In addition, we can even expect a further professionalization of the market (shown, e.g., by an increasing share of multi-hosts), which is regarded as an intrinsic process on the Airbnb market (Armas-Díaz *et al.* 2021b, p. 76).

Airbnb versus regulation: analysis of the impact on municipalities – As a consequence of the pandemic, the number of Airbnb listings in the three case studies dropped 31 per cent both in Amsterdam and London, and 23 per cent in Berlin between the Augusts of 2019 and 2020. Before the pandemic, the mitigating influence of regulation is most prominent in Berlin. Here, the total number of Airbnb listings grew only about 16 per cent between 2015 and 2019, while the numbers in Amsterdam (68%) and particularly in London (91%) skyrocketed.

With regard to the supply structure, these uneven trajectories between the three cities continue. Amsterdam is the only city where the share of multi-hosts (with more than one entry) decreased continuously (Figure 2). In Berlin, the commercial influence decreased until 2017 but has increased since then, even though the total number of listings decreased from 2015 to 2020. These results confirm the heterogeneous interpretations of Berlin’s regulations. On the one hand, this growing professionalism in the host structure can be traced back to 2018’s update of the regulation, where multi-hosting is not banned *per se*. On the other hand, there is a shift of 4000 STRs back to the regular housing market by the end of 2017 (Apur 2018, p. 13), which is also displayed by the relatively small growth of listings until 2019.

In London, our calculations show the most dominant presence of multi-hosts. Their influence has grown notably: In 2020, hosts with more than one offer held 49 per cent of all listings, in 2015 it was only 41 per cent (Figure 2).

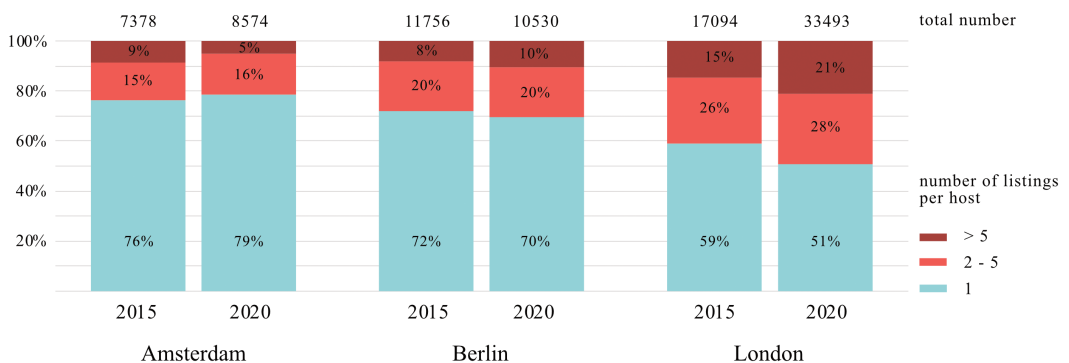


Figure 2. Share of listings according to host structure (number of listings per host). Own elaboration based on data of *Inside Airbnb* (2021).

Hence, in Berlin and London, these numbers rather show the respective regulations' weaknesses and support the argument that the current regulations do not impede a further professionalization of the host structure. This is first because large operators know better how to deal with rules and legislation (Smigiel 2020, p. 256; Anselmi 2021, p. 4). Second, they also learn how to circumvent certain regulations (Chen *et al.* 2021, p. 4).

The majority of Airbnb listings lie in central districts, which is consistent with the findings from other studies (Benitez-Aurioles 2018, p. 239; Hübscher *et al.* 2020, p. 196). Table 4 provides more insights into the development in central and more peripheral districts in all three cities for the years 2015–2019. Here, we chose the pre-COVID-19 setting for better comparability. Between 2019 and 2020, we only detect very small structural changes (max. change of 1.5 p.p. [percentage points] in the share of listings per district compared to the total Airbnb market).

Until 2019, all three cities show a relative (rather than a total) decline of listings in those urban districts that had the most listings in 2015 (mostly central districts), although we detect different intensities (Table 4). At the same

time, several other neighbourhoods recorded substantial growth, particularly those in the peripheries.

Among the central districts that in 2015 already had the highest shares of listings, those located in London showed the strongest growth (e.g. Tower Hamlets 127.5%). Contrary to that, central districts in Amsterdam and Berlin grew at a moderate (Amsterdam Centrum West 19.9%) or even slow pace (Berlin Friedrichshain-Kreuzberg 1.4%).

Figure 3 exemplifies this shift in Amsterdam, indicated by the changing distribution of hot spots. The maps show a reduction of the density of Airbnb listings central districts, and a clear growth in surrounding areas such as De Pijp-Rivierenbuurt and Oud-Oost, which we interpret as a 'spillover' effect due to the spatial ban, as described in other cases (Valentin 2021, p. 154). However, these results must be interpreted carefully, as 2020's data are affected due to the global pandemic.

These results are more ambiguous than we initially expected (Section 2). Comparing Amsterdam to London, one might confirm the effect of Amsterdam's (temporary) spatial ban. Contrary to that, the example of Berlin

Table 4. *The development of Airbnb listings in selected central and more peripheral districts. Own elaboration based on Inside Airbnb (2021).*

	Share on the total Airbnb-market (%)			Total number of Airbnb listings		
	2015	2019	Growth (p.p*)	2015	2019	Growth (%)
Amsterdam						
Centrum West	17.4	12.4	-5.0	1281	1536	19.9
Centrum Oost	11.2	8.9	-2.3	830	1102	32.8
De Baarsjes—Oud-West	14.8	16.9	2.1	1092	2085	90.9
De Pijp—Rivierenbuurt	10.4	12.0	1.6	770	1489	93.4
Berlin						
Mitte	21.4	22.2	0.8	2511	2929	16.6
Friedrichshain-Kreuzberg	26.4	23.0	-3.4	3100	3143	1.4
Neukölln	15.0	13.5	-1.5	1768	1848	4.5
Lichtenberg	1.7	3.2	1.5	199	439	120.6
Treptow	1.7	2.8	1.1	203	382	88.2
London						
Tower Hamlets	12.4	9.6	-2.8	2069	4708	127.5
Hackney	11.5	6.5	-5.0	1908	3184	66.9
Islington	8.4	5.9	-2.5	1404	2899	106.5
Brent	0.9	3.1	2.2	149	1498	905.4
Barnet	0.3	1.7	1.4	55	849	1443.6

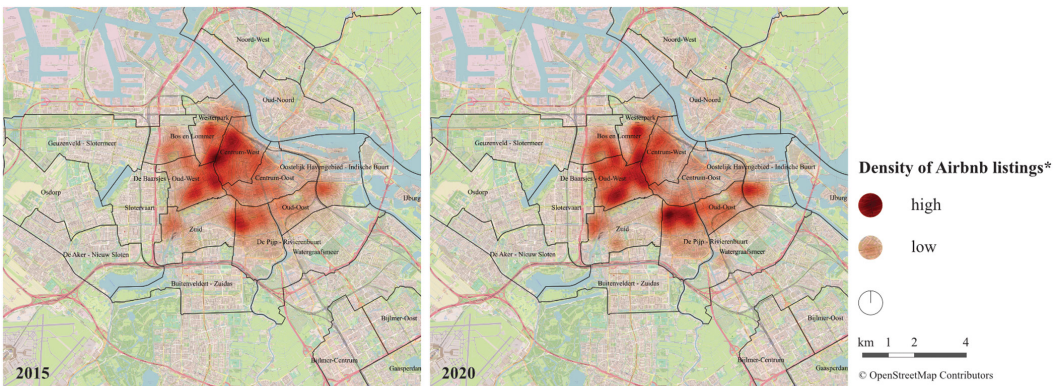
*Percentage points.

indicates that also a combination of other factors (such as saturation effects and other, city-wide restrictions) influence the spatial distribution. Less surprising is the case of London, which shows the highest overall growth rates both in the centre and the peripheries and the most liberal regulation among the three cities.

Apart from host structures and spatial patterns, the number of housing units removed from the housing market due to Airbnb is a

further aspect to evaluate current regulations. According to Seidl *et al.* (2017), a housing unit that is available on Airbnb at least 120 days and occupied at least 60 days is regarded as ‘removed’ from the regular housing market.

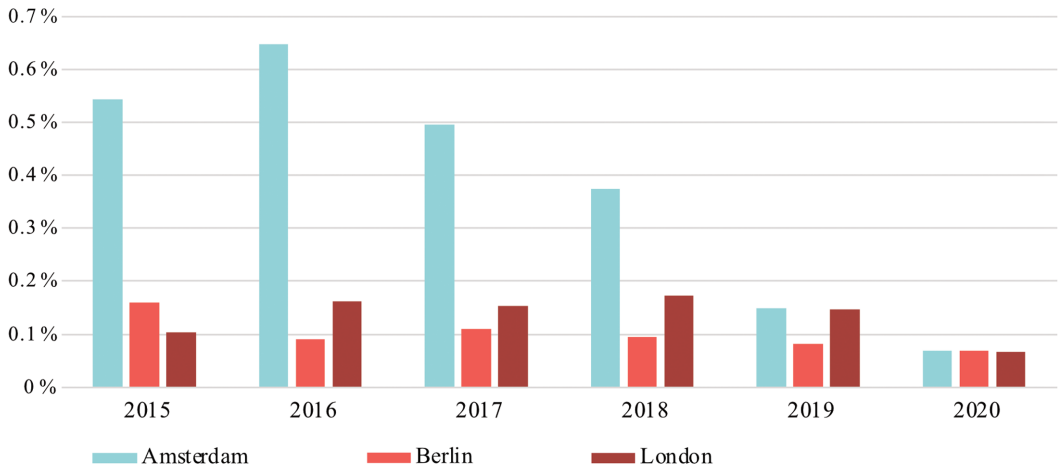
In all three cities, the percentage of housing units removed from the housing market (compared to the total housing market) has declined in recent years, even before the pandemic (see Figure 4). In addition, the share



*The density was calculated with the function "heatmap" in QGIS, which interpolates the density of point data.

Figure 3. Hotspot maps in Amsterdam. Own elaboration based on Inside Airbnb (2021) and Open Street Map and Geofabrik GmbH (2020).

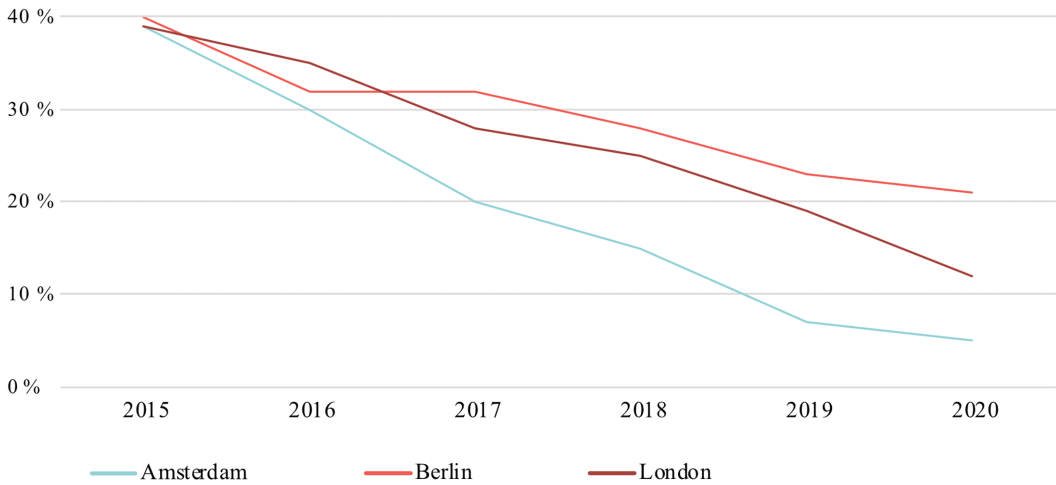
Share of housing units withdrawn from the housing market*, compared to the total housing stock



* housing units that were available on Airbnb at least 120 days and occupied at least 60 days (Seidl *et al.* 2017)

Figure 4. Share of housing units that were available on Airbnb at least 120 days and occupied at least 60 days (Seidl *et al.* 2017), compared to the regular housing market (2015–2020, August). Own elaboration based on data of Inside Airbnb (2021).

Share of housing units withdrawn from the housing market*, compared to the total Airbnb market



* housing units that were available on Airbnb at least 120 days and occupied at least 60 days (Seidl *et al.* 2017)

Figure 5. Share of housing units that were available on Airbnb at least 120 days and occupied at least 60 days (Seidl *et al.* 2017), compared to the total Airbnb market (2015–2020, August). Own elaboration based on data of Inside Airbnb (2021).

of such units among all Airbnb listings has decreased, too (Figure 5), which we interpret as a certain decriminalization of the Airbnb market. Still, there are significant differences. Amsterdam, which had by far the highest shares of housing units withdrawn from the housing market due to Airbnb in 2015 (0.54%) saw the most visible decline until 2020 (0.068%).³ At the same time, the share of such units on the total Airbnb market also decreased strongest in Amsterdam, namely from 39 per cent in 2015 to only 5 per cent in 2020. We particularly expect the stricter quantitative regulations (such as the 30-day rule in Amsterdam, compared to the 90-day rule in Berlin, and no strict cap in London, see Table 3) to play a crucial role for both drops in Figures 4 and 5. These drops were certainly reinforced by the increasing strictness of the regulation in Amsterdam (60-day rule from 2016 on; 30-day rule from 2018 on; Dredge *et al.* 2016, p. 24; Rekenkamer Metropool Amsterdam 2019).

In Berlin, the share of housing units withdrawn from the regular housing market decreased since 2015. It thus meets one of the regulations' original objectives, namely to protect the local housing market (Land

Berlin 2013), although the impact is merely slight.

In London, the picture is not as clear, because the share of housing units withdrawn from the regular housing market increased between 2015 and 2019, and decreased in 2020, which might be an effect of the pandemic.

CONCLUSION

Several of our 12 case cities represent what is called the typical 'European regulatory approach', as most of them aim to reduce negative externalities (Prayag & Ozanne 2018, p. 664). This study also confirms that municipalities put an individual focus on regulating STRs (Dredge *et al.* 2016, p. 35). Among the 12 cities, we detected a general trend to enforce regulations during the last years (see Figure 1), although the pace and intensity differ, with London being liberal and Amsterdam restrictive. The remaining cities group around these two extremes.

Scholars often criticize the 'minimal' impact of regulations on STRs (Von Briel & Dolnicar 2020, p. 5; Coccola-Gant *et al.* 2021,

p. 1601). This might be true for some cities, but at least in two of our three case studies, we see that regulations do have an impact and change the geographies of Airbnb. In this sense, we can confirm some of our hypotheses. We expected a more pronounced impact of regulations on the total number of Airbnb listings in Berlin and Amsterdam, compared to London, and this has been confirmed by the data.

In the case of London, our results add certainty to the prevailing question whether the observed liberalization will actually curb the city's Airbnb market (Gurran 2018, p. 301). The statistics show how London's liberal regulation (with no strict quantitative restrictions) has virtually led to a doubling of Airbnb listings.

What is more difficult to explain, is the fact that Berlin shows significantly lower growth rates compared to Amsterdam until 2019, with Amsterdam having the stricter regulations. One possible explication is to trace this back to Berlin's relatively strict law from 2014, although this law was later modified and liberalized (Busch 2019, p. 39). Still, Duso *et al.* (2020, p. 41) confirm the decline of Airbnb listings in Berlin, particularly after each legal modification in 2016 and 2018, and we added further evidence in this respect.

In Amsterdam, regulations proved to be more effective regarding the structure of the Airbnb market. On the one hand, regulations impeded the ongoing professionalization of the host structure that is observed in many cities (Cocola-Gant *et al.* 2021, p. 1061; Armas-Díaz *et al.* 2021b, p. 76). Amsterdam was the only case where this share of multi-hosts significantly dropped in the given period. On the other hand, the city's regulations also led to a notable decrease of the share of housing units withdrawn from the regular housing market (see Seidl *et al.* (2017) and definition in Figure 4). Here, we argue that gradually tightening regulations plays a crucial role, as Amsterdam passed from a 60-day cap in 2016, to a 30-day cap in 2018, and temporarily even had a spatial ban in 2020. Not only does this make the business model of multi-hosts less lucrative, it also forces hosts to continuously adapt to new rules.

In a setting where particularly large-scale actors are said to be resilient enough

to adapt to legal frameworks (Von Briel & Dolnicar 2020, p. 5; Anselmi 2021, p. 4), a dynamic regulatory setting might be the adequate answer to successfully tame an uncontrolled proliferation of listings. The design of our paper does not allow to draw a definite conclusion here, which is why more research should be done to explicitly investigate the impact of changing regulations on STRs. Still, our hypothesis is also confirmed by Chen *et al.* (2021, p. 1), who observe how the impact of regulations on the STR market in general decreases in the long run.

In this sense, Amsterdam is a clear exception, since other academics diagnose how most regulations do not restrict the ongoing professionalization of host structures (Smigiel 2020, p. 256). In London and Berlin, we must confirm this observation. Here, we see a notable increase of multi-hosts until 2019. As for Berlin, regulations such as a cap on renting out secondary residences (90 days) and registrations alone were apparently not enough to reduce the share of multi-hosts.

Contrary to that, Berlin's regulations indeed succeeded in reducing the share of housing units withdrawn from the regular housing market, at least marginally. Here, we suppose that a further reduction of the maximum number of days would help to decrease the pressure of Airbnb on the housing market even more. We base this assumption on our findings from Amsterdam, but also other studies who found that caps have the potential to limit the growth of listings (Chen *et al.* 2021, p. 12), and even make the Airbnb market less unstable (Vinogradov *et al.* 2020, p. 8).

Lastly, the spatiality of these phenomena is certainly the most intriguing and complex question. We have observed a spatial de-concentration of Airbnb listings in all three cities. Such a spatial dispersion is certainly the result of a saturation effect in city centres (Quattrone *et al.* 2016, p. 1385; Rabiei-Dastjerdi & McArdle 2020, p. 113), but strict regulations in cities such as Amsterdam have obviously reinforced this effect. In Berlin (with no spatial ban on STRs in central districts), we also suppose regulations that affect particularly commercial listings (such as

caps) to contribute to this deconcentration. This is because in central districts we usually expect the highest degree of professionalization (Hübscher *et al.* 2020). Comparing this spatial development of listings to London's case reveals, how the absence of strict regulations leads to high growth rates across the whole city.

This study has provided further evidence to believe in the effectiveness of certain regulatory instruments. However, given the changing and highly individual legal settings in each city, the adopting character of STRs, and other influencing factors such as visitor demands or external shocks (COVID-19), a continuous monitoring (Smigiel 2020, p. 256) is fundamental to understand the evolving geographies of STRs.

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Endnotes

- ¹ Inside Airbnb helps communities to comprehend the impact of Airbnb (Inside Airbnb 2021). This non-commercial project is led by Murray Cox and other activists. The data source has certain limitations; however, it is a valuable approach to explore the geographies of Airbnb listings (see, e.g., the discussion in Gurran & Phipps [2017, p. 85] and Smigiel *et al.* (2020), and the data assumptions presented by Inside Airbnb [2022]).
- ² The scraped data provided by Inside Airbnb entail a host ID for each listing, which helps to identify if one host offers several apartments.
- ³ This means that in 2015, 0.54% of all housing units in Amsterdam were withdrawn from the regular housing market due to Airbnb (0.068% in 2020).

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