

When local business faded away: the uneven impact of Airbnb on the geography of economic activities

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This paper investigates the unequal effect of Airbnb on the spatial organisation of economic activity in Madrid, Spain. Using establishment-level data from Madrid City Council and consumer-facing information from this short-term rental company, we find that Airbnb reshapes the urban space by encouraging tourist-oriented businesses, defined as businesses where tourists spend more than locals, at the expense of businesses primarily oriented to locals. These findings prove that short-term rentals do displace not only the local population but also resident-oriented businesses. Ultimately, our findings remain solid regardless of how we measure short-term rental activity and are not influenced by the growth of e-commerce or gentrification.

Keywords: digital platform, short-term rentals, Airbnb, neighbourhood change, retail sector, tourism

JEL Classification: R10, R23, Z32

Introduction

The rise of ‘home-sharing’ economic platforms is posing numerous challenges to urban planners and policymakers (Ferreri and Sanyal, 2018). While much of the public debate and academic literature have focused on the negative impact of short-term rentals on housing affordability (García-López et al., 2020), there remains a lack of understanding about how platforms like Airbnb are changing the economic landscape of urban areas (Celata et al., 2017). Specifically, it is still unclear to what extent the expansion of short-term rentals is affecting the mix of economic activities within cities. In that regard, the expansion of the short-term rentals phenomenon differs from other touristification processes, as short-term rentals not only increase the accommodation capacity in certain areas but also spread throughout urban geography, ultimately exacerbating problematic relations between residents and tourists as local businesses may be displaced. In turn, the loss of local businesses may lead to a decline in the local

population, as they no longer have access to the services they need for daily living.

The main focus of this paper is to examine the consequences of the displacement of residents by tourists on the economic landscape. Tourists tend to have different consumption patterns to residents and the influx of these new customers can affect various businesses in different ways. This impact is primarily local, as residents and tourists often spend a large portion of their time in the areas surrounding their accommodations. Local businesses¹ that serve the needs of residents are more likely to be negatively impacted by the arrival of tourists if their offerings do not match the preferences of tourists. On the other hand, businesses that cater to tourists may benefit from the influx of tourists facilitated by Airbnb, as short-term rentals expand their potential demand. Finally, the spatial organisation of urban economic activity may also be affected by Airbnb, as short-term rentals do not concentrate only in city centre areas

but expand across the urban geography and blurring the touristic city. Therefore, a central research question is the extent to which Airbnb influences the economic landscape of urban areas.

To investigate the impact of Airbnb on the spatial organisation of economic activity, we study the case of Madrid, Spain. Using establishment-level data from the Madrid City Council and consumer-facing data from Airbnb, we analyse how the local economy was affected by Airbnb from 2014 to 2019. We first assess the impact of Airbnb on the birth and death of establishments. We go beyond traditional measures of establishment turnover to examine transitions, or establishments that were open in 2014 or 2019 but have changed their primary activity. We are interested in whether Airbnb promotes establishments that cater to tourists, intended as businesses where tourists spend relatively more than locals and whether local businesses are being replaced by establishments in different sectors, such as restaurants or souvenir shops replacing drugstores or butcher shops. To do this, we take advantage of the temporary nature of our data and the uneven distribution of short-term rentals to isolate the impact of Airbnb from other trends related to e-commerce or gentrification.

Our main findings suggest that Airbnb contributes to business formation, particularly the creation of establishments that cater to tourists, such as restaurants and bars, and to a lesser extent, tourist-oriented retail shops like souvenir or gift stores. Conversely, we observe a decline in resident-oriented establishments, including both tradable and non-tradable businesses. Our results show that the increase in tourist-oriented establishments comes at the expense of local businesses. We complement our results with an instrumental variable strategy and show that our baseline results are robust to alternative measures of short-term rental activity. Further, we show that our main findings are not driven by other factors contributing to tourism gentrification aside from Airbnb like traditional accommodations and confounders related to gentrification and the growth of online shopping occurring at the same time as the disruption of Airbnb. This study adds to the literature on the economic impact of platform economies by providing the first evidence of the unequal effect of Airbnb on the spatial economic organisation within a city. Additionally, we propose a new methodology and classification to identify which businesses are at risk of decline due to Airbnb disruption in local areas.

The rest of the paper is organised as follows. In the next section, we provide a brief review of the previous literature. Afterwards, we describe our data and methodology in detail. Subsequently, we present our results and the corresponding robustness checks. Finally, we conclude by drawing our findings together in the last section.

Tourism gentrification and neighbourhood change

Over the last decade, urban tourism flows have skyrocketed, spurred by the outbreak of the digital platform economy (Stabrowski, 2017). Regardless of other tourist accommodations like hotels and hostels, digital platform-mediated short-term rentals have leveraged the existing stock of local housing to develop their activity. Flexibility and the lack of ad-hoc regulation in the early stages explain why we have recently witnessed enormous growth in short-term rentals. However, platform accommodation-induced tourism has not come without a cost. Several studies have noted how the proliferation of short-term rentals in urban areas is related to the increase in housing and rental prices (García-López et al., 2020; Barron et al., 2021). In that regard, 'home-sharing accommodations' have accelerated the already existing gentrification process (Wachsmuth and Weisler, 2018; Yrigoy, 2019; Ardura Urquiaga et al., 2020; Cocola-Gant and Gago, 2021). In particular, the widespread use of digital platforms nowadays spurs the expansion of digital accommodation companies across countries, intensifying transnational gentrification dynamics where worldwide higher-income classes appropriate local urban space (Sigler and Wachsmuth, 2015; Bantman-Masum, 2020).

Tourism gentrification, understood as a subset of the transnational gentrification process, diverges from other local population displacement processes. Classical gentrification replaces the resident population by higher-income individuals. Conversely, tourism gentrification implies a substitution of residents for tourists who do not settle down permanently (Lees and Ley, 2008). Looking at the consequences, both processes modify urban space. Unlike classical gentrification, which contributes to business transformations in line with the needs of the new affluent residents, tourism gentrification triggers urban changes to better satisfy tourists' needs (Behrens et al., 2022; Jover and Díaz-Parra, 2020). Despite those differences, the two processes may sometimes overlap as residents may also mimic broader tourist lifestyle attitudes (Novy, 2018). Short-term rental disruption adds another layer to the complexity of tourism-led gentrification. On the one hand, home-sharing accommodations allow landlords to generate extra income by renting unused housing space as rooms (Guttentag, 2015). However, commercial actors have monopolised the sector in recent years (Gil and Sequera, 2020). Therefore, to what extent Airbnb displaces the local population is context-specific and depends on the magnitude of Airbnb's professionalisation. Moreover, the geographic distribution of short-term rentals differs from other traditional accommodations. Home-sharing accommodations are more dispersed than hotels, which are concentrated in the city centre (Gutiérrez et al., 2017; Xu and Xu, 2021). The possibility of bringing tourists to

residential areas could exacerbate the tension between local-serving businesses and tourist-oriented activities but, at the same time, it contributes to decongesting tourism from central city areas. Besides, traditional accommodations already provide consumption amenities within their facilities; therefore, the potential impact on the local area is attenuated.

In the empirical literature about gentrification impacts on neighbourhood outcomes, only a handful of studies have gone beyond demographic and housing market changes, focusing on the transformation of business activities in those neighbourhoods (Lester and Hartley, 2014; Schuetz, 2014; Meltzer, 2016; Behrens et al., 2022; Glaeser et al., 2023). In this literature, leisure amenities and cultural and creative sectors have been marked as the primary services brought in by gentrifiers. The literature on Airbnb-led gentrification and business transformation is scant, and most papers have focused on the spillover of Airbnb's effects on consumption amenities (Alyakoob and Rahman 2022; Basuroy et al. 2020; Hidalgo et al. 2022b). This paper contributes to filling this gap, taking a broader approach to investigate how short-term rentals reshape urban space, considering the overall effect of short-term rentals across the spatial organisation of retail businesses.

Methodology

Data

Study area

Our study takes place in the city of Madrid. We choose the city of Madrid as a compelling case study since it is one of the most prominent destinations in Europe by the number of Airbnb listings (Statista, 2019) and it is the most visited city in Spain (INE, 2020a). These characteristics make Madrid a valuable case study for examining the impact of the accommodation platform economy on the urban economic landscape.

Dependent variable

For our study, we used administrative records from the Madrid Statistical Department, specifically the Madrid City Council's census of business premises. This dataset contains monthly information on all business premises in the Madrid municipality from 2014.² We focused on establishment dynamics in October 2014 and October 2019. We choose the same month to avoid seasonality problems. To eliminate the influence of new urban development on our analysis, we only consider business premises that were present in the dataset throughout the entire study period. This allows us to focus on changes in establishment dynamics driven by local demand rather than supply factors. The dataset includes information on the location and accessibility of each premise, as well as data on the business activities of each establishment.

For our purposes, we are interested in businesses that cater to tourists or residents and whose consumption is local. The local consumption condition is a key in our analysis since we are exploiting the fact that Airbnb users spend a high proportion of their time budget in areas close to their accommodation, ultimately impacting the urban economic landscape. To classify the establishments as tourist-oriented or resident-oriented, we rely on already-existing classifications and adapt them to our setting (Meltzer and Schuetz, 2012; Meltzer and Capperis, 2017; Allen et al., 2020; Aparicio et al., 2021). For this classification, we consider establishments to be tourist-oriented if the expenditure of tourists is higher than that of residents. As a result, mostly tourist-oriented activities comprise local consumption amenities such as restaurants, bars and coffee shops. Previous research has shown that Airbnb is behind the rise in food and beverage establishments (Alyakoob and Rahman 2022; Basuroy et al. 2020; Hidalgo et al. 2022b). On top of that, food and beverage services correspond to the main expenditures made in situ by tourists (INE, 2020b; Aparicio et al., 2021). We complement this group with other stores that target tourist needs, like clothing, souvenirs, gifts or currency exchange stores.

For resident-oriented establishments, we select those activities that fulfil the basic needs of daily life. In particular, we cover a broad set of neighbourhood amenities that serve local consumer demand directly (Meltzer and Capperis, 2017). We include in this group tradable and non-tradable services. Among the tradable category are food-related stores such as butcheries or fishmongers and device-related stores like drugstores, phone and newsagent stores. The non-tradable group includes personal care and education services: hairdressers, depilation and nursery schools. We decided not to include higher-level education and health services in our analysis as they might not have only local consumption. We do not include other potential local businesses, such as pharmacies or tobacco shops, as the location is regulated and responds to local planning ordinances, and therefore their location is not subject to the same potential displacement as other neighbourhood uses. In order to avoid the overlap of activities that cater to tourists or locals, businesses that host both tourist- and resident-oriented activities are not classified as either tourist- or local-oriented establishments. Table 1 shows our proposed classification.

After classifying establishments based on their target population and their activity, we calculated the first set of business dynamics variables: birth and death. Birth (Death) is a binary variable that is assigned a value of 1 for establishments that were closed (opened) in 2014 and opened (closed) in 2019. In order to understand the impact of Airbnb on business activities, we further distinguished birth and death by our proposed classification of tourist- and resident-oriented businesses. As a result, our first group of business dynamics variables consists of: *birth*, *birth-tourist*, *birth-resident*, *death*, *death-tourist* and *death-resident*.

Table 1. Tourist-oriented and resident-oriented activities classification.

Establishment type	Activity code	Activity description
Tourist-oriented		
Souvenirs	661002, 477807, 477808	Exchange currency, expositions, gift shop
Restaurant	561001, 561004	Restaurant, bar restaurant
Bar	561005, 563002, 563005	Bar with kitchen, bar without a kitchen, bar with performance
Ice-cream parlour	472902, 472903, 472904	Ice-cream parlour (in-place elaboration), ice-cream takeaway
Cafe	561006, 561007	Cafe, teahouse
Limited-service eating places	472406, 472407	Take-away (in-place elaboration), take-away
Ready-made meals	471101	Ready-meal store
Pastry shops	472402, 472403	Pastry, pastry with baked goods
Clothing store	477101	Retail trade of clothing in specialised stores
Resident-oriented		
Clothing textile	464201, 952004, 960101	Textile shop, textile laundry, tailor
Furnishing	475903, 433001	Furnishing
Retail food	471104, 472907, 472102, 472203, 472302	Convenience, fruit, butchery, fishmonger, candy
Retail non-food	477801, 474201, 931008	Drugstore, phone store, gym
Beauty salon	960206, 960203, 960201	Hairdresser, beauty salon, depilation
Car workshop	452002, 472102, 855001	Car workshop, driving school
Newsagent	476201, 821001	Newsagent, print shop
Nursery	851001	Nursery school

Notes: Activity codes refer to the most disaggregated information about business service offerings. These codes are based on the classification of activities used by the Madrid City Council. The proposed classification is not exhaustive as other activities which are not categorised as either tourist or local-oriented are not considered as they do not satisfy the local consumption assumption and expenditure patterns, despite being present in the Madrid City Council census of business premises.

As a second step, we focused on transitions, that is, business premises that changed their main activity and storefront name between 2014 and 2019.³ Therefore, we created a binary variable transition that is assigned a value of 1 for business premises that were open in both years but changed their activities during the period 2014–2019. This group is of particular interest because it allows us to measure the effect of Airbnb on business displacement. Unlike other business dynamics metrics such as births or deaths, transitions better reflect the reorientation of local supply because they refer to establishments that are open in our five-year period but change their service offerings. Births and deaths, on the other hand, might be more closely tied to long-term business trends. For the case of births, we do not have information about the business premises prior to 2014. For the case of deaths, we are unable to go beyond 2019 because of the COVID-19 outbreak, which has caused unprecedented disruption to business dynamics. In particular, the implementation of furlough schemes in the tourism sector in Spain prevents us from including recent years in our time frame because of the difficulty of

distinguishing the impact of the decline in tourist flows due to public aid (Hidalgo et al., 2022a).

As we are interested in examining whether Airbnb-induced tourism contributes to the displacement of establishments towards tourist-oriented activities, we defined two binary dependent variables, *transition-tourist* and *transition-resident*, which are assigned a value of 1 for business premises that changed their offerings in 2019 towards tourist-or resident-oriented activities, respectively. Additionally, it is possible that Airbnb may contribute to the displacement of establishments towards tourist-oriented activities at the expense of businesses that are more focused on serving the needs of local residents. To test this hypothesis, we focus on two specific transitions: *transition resident-tourist* and *transition tourist-resident*. *Transition resident-tourist* (*transition tourist-resident*) is assigned a value of 1 for establishments that became tourist-oriented (resident-oriented) in 2019, given that they were resident-oriented (tourist-oriented) in 2014. Figure 1 provides evidence of the spatial displacement of resident-oriented businesses by



Figure 1. Resident-oriented establishments are displaced by tourist-oriented.

tourist-oriented activities in the trendy tourist neighbourhood of Embajadores in Madrid.

Short-term rental activity

To measure short-term rental activity, we used consumer-facing information from the largest company in the sector, Airbnb. Specifically, we obtained data from Inside Airbnb, an independent, non-commercial website that scrapes information directly from the Airbnb site for various cities and countries worldwide.⁴ The entry of Airbnb in Madrid is not evenly distributed, concentrated in the city centre and spreading to the periphery (Gil and Sequera, 2020; Hidalgo et al., 2022b). As a result, establishments in Madrid are differently exposed to Airbnb-induced tourism depending on the location of Airbnb listings. To consider this pattern of short-term rental activity and its influence on the retail business sector, we draw a 150 m radius buffer around each business premise in 2014 and 2019.⁵ Then, we count the number of short-term rentals within each buffer and calculate the absolute difference in the number of short-term rentals in each buffer over the five-year period. Figure 2 shows the creation of the buffer using the Embajadores neighbourhood as in Figure 1. We preferred our Airbnb intensity measure for aggregating short-term rental data instead of census tracts or neighbourhoods because both are based on arbitrary boundaries that may not reflect the Airbnb-induced tourism effect around each business premise. Additionally, buffers are homogeneous measures in size and shape, while other predefined spatial partitions may be heterogeneous in shape and scale. In that regard, the creation of buffers around each estab-

lishment allows for measuring its potential demand in a more reliable way compared with pre-established administrative measures, where the location of the establishment is not necessarily central. Lastly, we address the issue of jittering coordinates by Airbnb by using a 300 m diameter circumference area.

Control variables

We complement our dataset with socio-demographic information which contributes to explaining urban establishment dynamics such as population and average household income at the census tract level. We also add distance to the city centre as an additional covariate to control for city centre trends. Finally, we include a dummy variable to measure the accessibility level of the establishment (ground level or within a mall). A final list with all the variables used can be found in [Supplementary Table AI](#) and its main descriptive statistics in [Supplementary Table AII](#) in the Supplementary Appendix.

Specification

The purpose of this paper is to investigate the impact of Airbnb's entry into urban business transformation. Specifically, we aim to determine to what extent Airbnb has affected business dynamics metrics such as the probability of openings, business closures, or changes in business activity, distinguishing between establishments oriented towards tourists and those oriented towards residents. To address our research question, we use the following linear probability model specification:

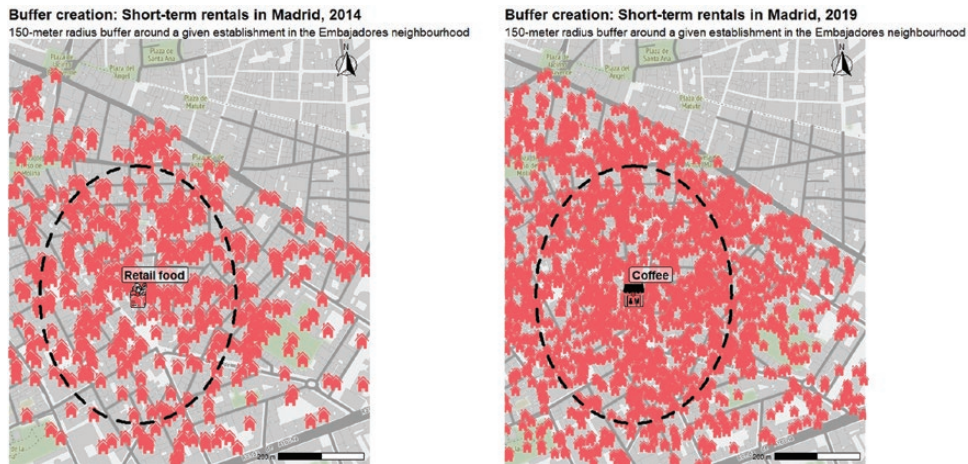


Figure 2. Buffer creation.

$$\Pr(\text{Establishments dynamics}_i^{2019-2014}) = \beta \text{Airbnb}_i + \rho X_c + \vartheta Z_i + \alpha_s + \gamma_n + \epsilon_i \quad (1)$$

where $\text{Establishments dynamics}_i^{2019-2014}$ refers to the business dynamics outcome variables in [Supplementary Table AI](#) depending on the specification. Our main coefficient of interest is β , which measures the effect of a change in the number of short-term rentals around a 150 m radius buffer of business premises i on the probability that the establishment undergoes any change in business activity. We expand our specification to control for sociodemographic characteristics measured in 2014 at the census tract level X_c , such as population and the average household income. We measure them at the beginning of our sample period to avoid potential contamination effects from our treatment variable. To account for different geographical business dynamics trends depending on the location of the economic activity, we add the distance to the city centre as an explanatory variable. We include establishments-specific characteristics Z_i related to its accessibility (ground level or within a mall) and we control for activity α_s and neighbourhood γ_n fixed effects.⁶ In this way, we account for potential trends in the emergence or decline of certain economic activities in the city and unobserved time-invariant characteristics at the neighbourhood level. We cluster the standard errors at the neighbourhood level as business premises share commonalities at a higher treatment level. Besides, we avoid the potential problem of overlapping buffers.

One potential concern in our baseline specification is that general trends may influence the dynamics of tourist and local-oriented establishments in addition to the presence of Airbnb. While we have controlled for socioeconomic trends and included time-invariant location characteristics and activity-specific trends, there may still be some unconfounded factors that our ordinary least squares

(OLS) specification cannot control for. To address this issue, we used an instrumental variable (IV) strategy. We use the number of rental houses in 2011 as an instrument for our Airbnb variable, following the approach of [Hidalgo et al. \(2022b\)](#). The idea behind this instrument is that short-term rentals are more likely to grow in areas with a higher stock of rental houses since Airbnb's entry into the market reduces the supply of long-term rentals to capitalise on the short-term rental price premium ([Horn and Merante, 2017](#); [García-López et al., 2020](#); [Barron et al., 2021](#)).

We obtained rental house data from the Spanish 2011 Census, which is available only at the census tract level. Since our buffers are larger than the median census tract area in Madrid, we imputed the number of rental houses in each buffer using the proportion of the area of each census tract within the buffer (See [Supplementary Figure AI](#) in the Supplementary Appendix).⁷

Results

This study aims to investigate the effect of short-term rentals on the dynamics of urban establishments, using the city of Madrid as a case study. The units of analysis in this study are business premises. We examine whether business premises in Madrid experienced any changes in their business status between October 2014 and October 2019. In the first stage of the analysis, we investigate the effect of Airbnb on the probability that an establishment opens or closes and whether this change in activity status is driven by the orientation of the establishment to tourists or residents. In the second stage, we focus on transitions: establishments that were open in 2014 and 2019 but changed their main activity. We also differentiate between tourist-oriented and resident-oriented businesses in our analysis of transitions to understand the nature of retail change. Finally, we investigate whether

the transitions related to tourism come at the expense of local businesses.

Table 2 presents the results of the first set of business dynamics variables using a baseline linear probability model specification. The sample size for each specification varies because of the different comparison groups. In the case of the birth group, we include only inactive establishments that were present between 2014 and 2019 and establishments that were born in 2019 and closed in 2014. In the death group, we include all establishments that were open in both 2014 and 2019 and those that were closed in 2019 but opened in 2014. When examining the impact of being a tourist-oriented or resident-oriented business on birth or death probabilities, we use only establishments in the respective category (births and deaths) as the comparison group.

The results in Table 2 show that Airbnb has a positive effect on the creation of new establishments (column 1), but does not seem to affect the probability of closure (column 4). This finding is consistent with Jiménez et al. (2022), who found that Airbnb has a positive impact on the arrival of tourists in several Spanish cities, including Madrid. The positive effect of short-term rentals on business openings may be due to the additional income flows generated by Airbnb-induced tourism. However, it is worth noting that the impact of Airbnb on business premises' service offerings is not uniform. In particular, Airbnb increases the probability of entry of tourist-oriented businesses (column 2) but decreases the probability of the creation of resident-oriented establishments (column 3). A reverse pattern is observed for the case of closures, with an increase in the

probability of closure for resident-oriented establishments (column 6).

Table 2 provides insights into the impact of the arrival of short-term rentals on the dynamics of businesses in Madrid, but we must be cautious in interpreting the results because of the coefficient of interest in these specifications. Airbnb listings may be self-selecting in areas of the city where some form of urban revitalisation is occurring. In this case, the positive effect on the birth and the null effect on the death specification may be due to unobserved city-specific events that would have occurred even in the counterfactual scenario where Airbnb did not enter these areas. To address this issue, we perform an instrumental variable analysis and report the results in Supplementary Table AIII. These results confirm the findings from the baseline model, and in some cases, the effects are even stronger under the instrumental variable model.

Last, the birth and death specifications are subject to left and right censoring due to data limitations. Therefore, we complement our first set of business dynamics variables with the transition group to try to partially address censoring. Table 3 summarises the main results.

The results of our second set of business dynamics metrics confirm the findings from the previous analysis: Airbnb increases the probability that business premises will transition to a tourist-oriented activity (column 8). Specifically, an increase of 15 Airbnb listings (the average Airbnb listing change within the buffer) around business premises that undergoes any type of transition increases the probability of transitioning to a tourist-oriented

Table 2. Linear probability model for establishments birth and death dynamics (OLS).

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Pr(Birth = 1)	Pr(Birth, tourist = 1)	Pr(Birth, resident = 1)	Pr(Death = 1)	Pr(Death, tourist = 1)	Pr(Death, resident = 1)
Airbnb buffer	0.010*** (0.004)	0.015*** (0.006)	-0.012*** (0.004)	0.001 (0.001)	-0.004 (0.012)	0.015** (0.007)
Mean depend. var.	0.792	0.193	0.238	0.0233	0.195	0.262
Marginal % effect	1.120	7.756	-5.036	4.298	-2.052	5.730
R ²	0.17657	0.06799	0.03202	0.02464	0.13997	0.09923
Observations	7732	6123	6123	74,227	1868	1868

Notes: Statistical significance at the 1, 5 and 10% levels is indicated by ***, * and , respectively. The standard errors for the estimates are clustered at the neighbourhood level. The Airbnb buffer variable represents the absolute change in the number of short-term rentals within a 150 m radius ring around each establishment between 2014 and 2019. The coefficient for this variable is scaled by 15, which represents the average Airbnb listing change within the buffer. The model also includes control variables such as the logarithm of the population, average household income at the census tract level, a dummy variable to identify the accessibility of the establishment (grouped or storefront) and distance to the city centre. Neighbourhood fixed effects are included in each specification, and activity codes fixed effects are included in the first and fourth columns. The number of observations varies across each specification depending on the reference comparison group. The birth group comprises only inactive establishments that were present between 2014 and 2019 and establishments that were born in 2019 and closed in 2014. The death group includes all establishments that were open in both 2014 and 2019 and those that were closed in 2019 but open in 2014. When examining the impact of being a tourist-oriented or resident-oriented business on birth or death probabilities, we use only establishments in the respective category (establishments that were born in 2019 and closed in 2014 for births and establishments that were closed in 2019 but open in 2014) for deaths as the comparison group.

Table 3. Linear probability model for establishments transitions dynamics (OLS).

	(7)	(8)	(9)	(10)	(11)
Dependent variable:	Pr(Transition = 1)	Pr(to tourist = 1)	Pr(to resident = 1)	Pr(resident to tourist = 1)	Pr(tourist to resident = 1)
Airbnb buffer	0.003 ^{***} (0.0001)	0.010 ^{**} (0.006)	-0.007 ^{**} (0.004)	0.025 ^{***} (0.007)	-0.004 (0.004)
Mean depend. var.	0.109	0.244	0.219	0.217	0.197
Marginal % effect	2.752	4.098	-3.196	11.520	-2.030
R ²	0.228	0.184	0.107	0.169	0.218
Observations	85,791	9334	9334	1518	1600

Notes: Statistical significance at the 1, 5 and 10% levels is indicated by ^{***}, ^{**} and ^{*}, respectively. The standard errors for the estimates are clustered at the neighbourhood level. The Airbnb buffer variable represents the absolute change in the number of short-term rentals within a 150 m radius ring around each establishment between 2014 and 2019. The coefficient for this variable is scaled by 15, which represents the average Airbnb listing change within the buffer. The model also includes control variables such as the logarithm of the population, average household income at the census tract level, a dummy variable to identify the accessibility of the establishment (grouped or storefront) and distance to the city centre. Neighbourhood fixed effects are included in each specification, and activity codes fixed effects are included in the first and fourth columns. The number of observations varies across each specification depending on the reference comparison group. The transitions group is comprised of all establishments that were open both in 2014 and 2019 with no change and establishments that were open in both 2014 and 2019 and changed activity and storefront name. The transition-tourist and transition-residents group is comprised only of transition establishments. The transition resident-tourist (transition tourist-resident) group is comprised only of transition establishments whose previous activity was local-oriented (tourist-oriented).

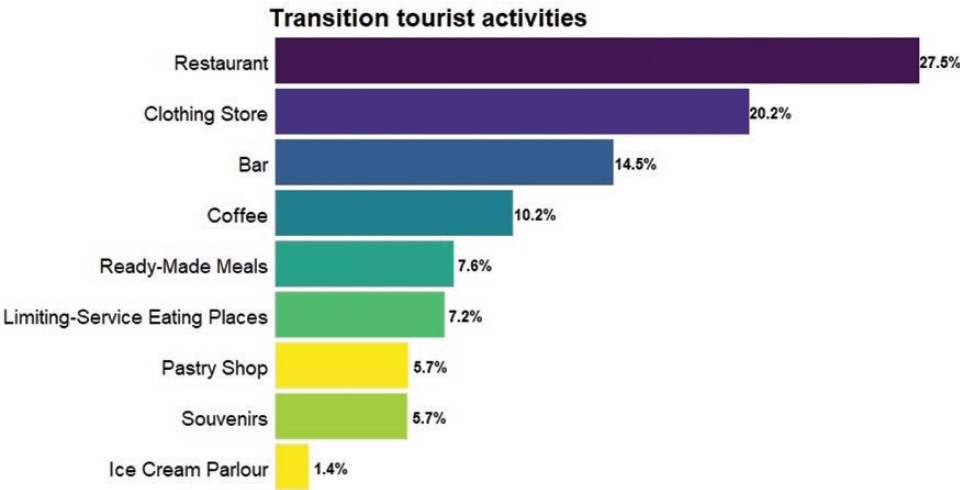


Figure 3. Tourist-oriented transitions.

establishment by 15 percentage point, which represents a 60% increase over the mean of the dependent variable. At the same time, this increase in short-term rentals decreases the probability of transitioning to a local business by a similar magnitude (column 9). As shown in Figure 3, the increase in the probability of transitioning to a tourist-oriented business is driven mainly by clothing stores, restaurants, bars and cafe services. These establishments typically have more flexible opening hours that are more convenient for tourists, as they are open during the day and at night, while souvenir or gift shops are usually only open during the day.

So far, we have found that Airbnb contributes to the rise of tourist-oriented business in Madrid, measured through births and transitions. At the same time, short-term rental negatively affects local businesses by increasing the probability of closure and decreasing the probability of birth and transition. We claim that the main mechanism behind our findings is the substitution of residents for tourists whose consumption patterns differ from those of residents. While the growth of businesses that cater to tourists may be part of a larger trend related to the growth of the short-term rental sector in Spain and Madrid (Jiménez et al., 2022), it is also possible that other

factors are contributing to the decline of businesses that cater to residents. To pinpoint the specific role of Airbnb in this shift, we have analysed whether the transition of businesses to those that cater to tourists is occurring at the expense of other sectors or, more specifically, at the expense of local-oriented businesses. We have found that Airbnb has a greater impact on the displacement of non-tourist-related activities (see columns 10 and 11 of Table 3 for the OLS baseline model and Supplementary Table AIV for the IV model). Indeed, whereas Airbnb increases the probability that an establishment becomes tourist-oriented, conditional on being a local business in the past, we do not observe the opposite. To get a better picture of which types of local activities are being displaced by touristic business, we reproduce in Figure 4

the transition from resident to tourist-oriented activities. We can observe that consumption amenities account for most resident-tourist transitions in both directions, that is, from food-oriented local businesses to food-oriented tourist establishments. Moreover, other non-tradable local businesses such as beauty salons or clothing textile activities are also crowded out, reflecting that the displacement of local activities is not concentrated in specific sectors.

Consequently, our findings reveal the important role that Airbnb has played in the reconfiguration of economic activity in the city of Madrid, a case that can be extended to other European tourist cities where ad-hoc regulations are being introduced to cope with the diffusion of short-term renting (Valentin et al., 2019).

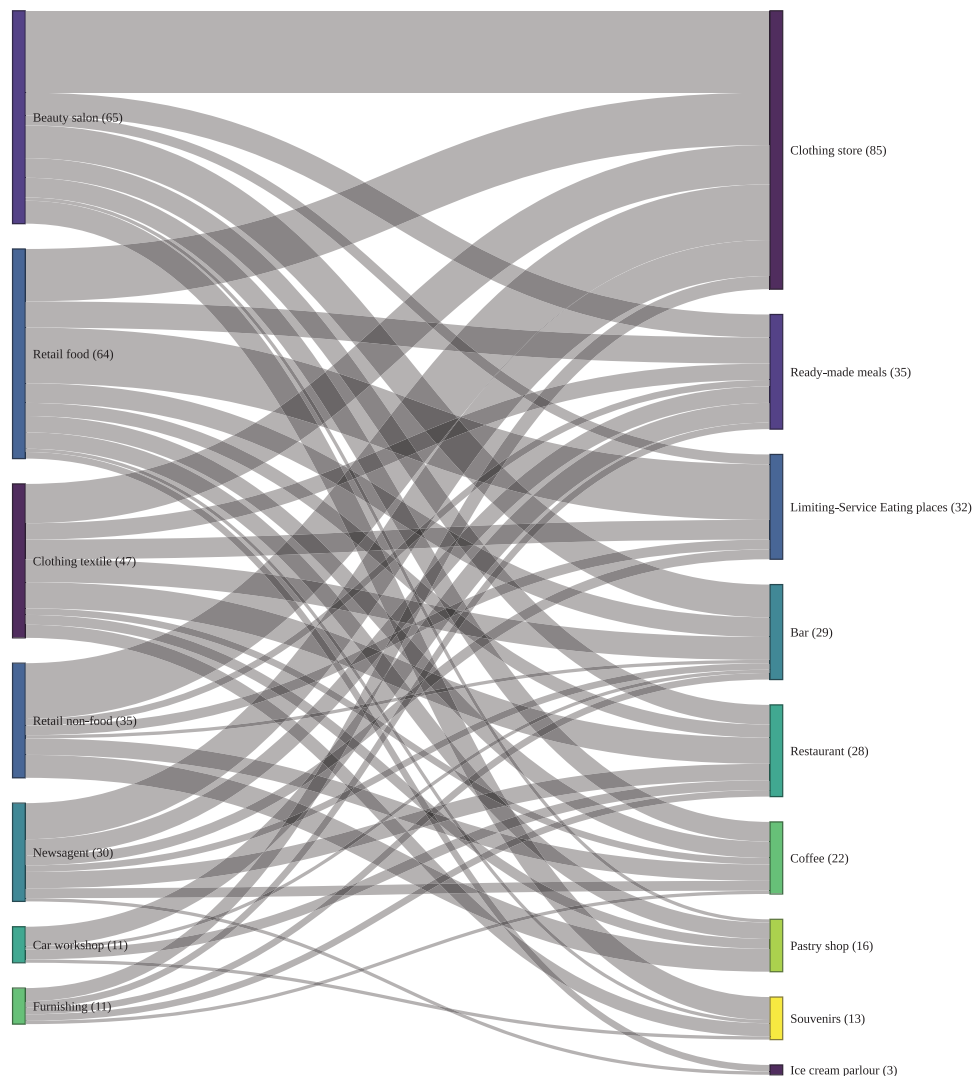


Figure 4. Resident-oriented establishments are displaced by tourist-oriented establishments.

Robustness checks

In this section, we test the robustness of our main results from Table 3 in different ways. First, we control whether our main tenets hold whenever we modify the way we measure short-term rental activity. Second, we leverage the heterogeneous distribution of short-term rental activity across Madrid by removing from our sample all observations within a neighbourhood where a new hotel settles to avoid contamination of tourist effects stemming from traditional accommodations. Third, we test whether the transitions towards tourism-oriented business and the decline in resident-oriented establishments mask other business-related phenomena beyond Airbnb-induced tourism, such as gentrification and e-commerce.

Short-term rental measurement

To account for the fact that some businesses may be more exposed to local demand shocks caused by Airbnb than others, we have used a 150 m radius buffer around each business premises as our main variable of interest to calculate the change in the number of short-term rentals over a five-year period. This approach allows us to avoid using administrative units such as census tracts or neighbourhoods, which may not accurately reflect the specific impact of Airbnb on business dynamics. However, this method does not take into account the size of each accommodation unit or its demand. To address this issue, we used the maximum number of guests that a listing can accommodate as an alternative measure of Airbnb activity, calculating the difference between 2019 and 2014 for each buffer. We also considered the number of reviews for each listing as another measure of Airbnb activity, calculating the difference between 2019 and 2014 for each buffer. Furthermore, we have varied our buffer by 50 m up and down in alternative specifications to test the robustness. Results A–D from Table 4 show that our main findings hold regardless of the method used to measure Airbnb activity.

Traditional accommodations

To further assess the impact of Airbnb on local businesses, we have examined whether our main findings hold when we remove certain neighbourhoods from our sample where new traditional accommodations have opened.⁸ We are deleting mainly city centre neighbourhoods where the bulk of the short-term rental activity is concentrated. Our decision is conservative as we do not expect all economic activities in the neighbourhood to be affected by the arrival of a new hotel, but only those closest to it. However, our decision to exclude these neighbourhoods is also motivated by the fact that the location of new hotels can be seen as a proxy for the overall tourist attractiveness of an area. As such, it is likely that changes in the economic activity in these neighbourhoods are driven by overall tourist flows rather than short-term rentals-induced tourism. The results in E from Table 4 provide evidence that busi-

ness displacement is driven mainly by Airbnb's arrival and not other trends in the tourism sector. In principle, this is because Airbnb concentrates not only on tourist enclaves but also on other residential areas with good public transit and cultural cachet (Gutiérrez et al., 2017; Wachsmuth and Weisler, 2018; Deboosere et al., 2019). We can observe that once touristic neighbourhoods are removed, the probability of a transition to a tourist-oriented business doubles. Therefore, outside the tourist area of the city, the effect of Airbnb is even more intense and disruptive.

Gentrification and e-commerce

Our business classification for tourism consists mainly of amenities for consumption, such as food and beverage establishments. While tourists often spend a significant amount of their financial budget on food while on vacation, local residents also consume these amenities. In this case, 'touristification' may be confused with the adoption of tourist-like behaviours and consumption habits by local residents. Moreover, the proliferation of food and beverage establishments has been connected to the process of gentrification in several studies (Novy, 2018; Almagro and Dominguez-Iñio, 2022). If Airbnb enters areas where locals are more likely to adopt tourist-like consumption patterns, our results may not accurately capture the pure effect of Airbnb-induced tourism. To address this potential confounder, we conduct a falsification exercise by replacing tourist-oriented activities with those that have been linked to gentrification.⁹ Our findings, shown in Result H in Table 4, suggest that gentrification does not account for our previous results. These findings align with the idea that Airbnb does not necessarily concentrate on gentrifying areas and can be found beyond central business districts with high rates of traditional accommodations, as noted by Wachsmuth and Weisler (2018).

The prevalence of tradable establishments in our local-business category makes our empirical analysis exceptionally sensitive to shocks related to this sector. One possible explanation for the decline in local businesses could be the rise of e-commerce. If this trend is happening in the same areas where Airbnb is present, we would be capturing the combined impact of online shopping and tourist activity driven by Airbnb. To ensure that our results are specifically due to a local demand shock caused by Airbnb and not any other factors, we restrict our resident-oriented category to only non-tradable businesses.¹⁰ Additionally, in another exercise, we exclude clothing businesses, ready-made meal providers and limited-service eating places from our classification of businesses oriented towards tourists. We made this decision because the concentration of short-term rentals and clothing stores in the city centre of Madrid makes it difficult to distinguish the effects of Airbnb-induced tourism from other local spending effects. We also chose to exclude ready-made meals

Table 4. Robustness checks.

Dependent variable:	Pr(Transition = 1)	Pr(to tourist = 1)	Pr(to resident = 1)	Pr(resident to tourist = 1)	Pr(tourist to resident = 1)
A. Airbnb buffer (Guests)	0.003*** (0.0001)	0.010** (0.005)	-0.005** (0.0003)	0.025*** (0.005)	-0.003 (0.004)
B. Airbnb buffer (Reviews)	0.002*** (0.0001)	0.008* (0.004)	-0.006* (0.003)	0.019* (0.010)	-0.007* (0.003)
C. Airbnb buffer (Radius 100 m)	0.004*** (0.001)	0.019** (0.009)	-0.010 (0.007)	0.054*** (0.016)	-0.001 (0.007)
D. Airbnb buffer (Radius 200 m)	0.001*** (0.0001)	0.007 (0.004)	-0.004** (0.003)	0.016** (0.006)	-0.004 (0.003)
E. Airbnb buffer (No hotel neighbours)	0.003** (0.001)	0.018*** (0.003)	-0.004 (0.004)	0.022** (0.009)	-0.004 (0.004)
F. Airbnb buffer (Only non-tradable)	0.003*** (0.0001)	0.010* (0.006)	-0.004** (0.001)	0.033** (0.016)	0.009 (0.004)
G. Airbnb buffer (Broader trends)	0.003*** (0.0001)	0.009* (0.003)	-0.007** (0.001)	0.025** (0.008)	0.009 (0.015)
Dependent variable:	Pr(Transition = 1)	Pr(to gentrif. = 1)	Pr(to resident = 1)	Pr(resid. to gentrif. = 1)	Pr(gentrif to resid. = 1)
H. Airbnb buffer	0.003*** (0.0001)	-0.001 (0.001)	-0.007** (0.004)	-0.004 (0.004)	-0.034 (0.036)

Notes: Statistical significance at the 1, 5 and 10% levels is indicated by ***, ** and *, respectively. Cluster standard errors at the neighbourhood level. Airbnb buffer guest's variable represents the absolute change in the total capacity (maximum number of guests) in each Airbnb listing within a 150 m radius ring around each establishment between 2014 and 2019. The Airbnb buffer reviews variable represents the absolute change in the total number of reviews for each Airbnb listing within a 150 m radius ring around each establishment between 2014 and 2019. Airbnb buffer variable represents the absolute change in the number of short-term rentals within a 150 m radius ring around each establishment between 2014 and 2019 in rows E–G, a 100 m radius in row C and a 200 m radius in row D. The coefficient for each variable has been multiplied by the average increase in the Airbnb measure in each specification, that is, 1000, 50 and 15 for reviews, guests and Airbnb listing measures, respectively. The model also includes control variables such as the logarithm of the population, average household income at the census tract level, a dummy variable to identify the accessibility of the establishment (grouped or storefront) and distance to the city centre. Neighbourhood fixed effects are included in each specification and activity codes fixed effects are included in all specifications. The number of observations varies across each specification depending on the reference group. The transitions group is made up of all establishments that were open in both 2014 and 2019 with no change and establishments that were open in both 2014 and 2019 and changed activity and storefront name. The transition-tourist and transition-residents group is comprised.

and limited-service eating places due to their potential relationship with the growth of ridesharing businesses (Gorback, 2020). Finally, we did not include newsagents in our classification of businesses oriented towards residents because their decline may be due to the death of print media. Result G in Table 4 confirms that our main findings are not affected by broader trends.

As a final check, we employ sensitivity analysis tools for regression models developed by Cinelli and Hazlett (2020) to assess whether our results are robust to the potential existence of confounders, interacting non-linearly. Supplementary Table AVI in the Supplementary Appendix confirms our main findings.

Discussion and conclusion

The emergence of the accommodation platform economy, with Airbnb being a prominent player, has significantly

impacted the spatial organisation of urban economies. However, this impact varies across locations and different types of businesses. Using Madrid as a case study, we found that short-term rentals reshaped the urban space to better meet the needs of tourists. However, the impact on the economy, driven largely by the growth of tourist-oriented businesses, masks negative effects on non-touristic sectors. In particular, businesses that cater to the needs of local residents are particularly impacted by the arrival of short-term rentals, indicating that Airbnb does displace resident-oriented businesses. Our findings are robust to alternative measures of Airbnb activity and to other tourist actors or confounding factors related to gentrification and the rise of online shopping.

The present study makes meaningful contributions to tourism gentrification and neighbourhood change literature. We show that the effect of Airbnb exposition expands beyond the city centre. In this way, short-term rentals may fuel uneven geographies by contributing to

expelling the population from non-central neighbourhoods. At the same time, Airbnb-induced tourism can help to decongest the city centre of tourists and redistribute them better across the city. The uneven effect on the spatial organisation of the economic activity demands local authorities to address two issues: the levels of short-term rentals that are considered globally desirable in the city and the manner in which they are distributed throughout the territory. Therefore, policymakers should take into account the uneven impact of Airbnb on businesses depending on their target consumers, possibly undertaking initiatives such as food security measures to ensure that the basic needs of local residents are met. In addition, the loss of local businesses may compromise the 15 min city strategy, which is already in place in a growing number of cities. Otherwise, there is a risk of eroding the collective city space in the affected neighbourhoods, thus amplifying the touristification phenomenon already occurring in urban areas. We believe that our results may help design policy interventions that consider not only its immediate effect on the housing rental market but also the structural change in the geography of economic activities.

Further research is necessary to confirm our findings across cities and over time. Our methodology, which is based on existing classifications of tourist-oriented versus local-oriented businesses, publicly available information on short-term rentals, and business register data, can be easily replicated in other contexts. However, it is worth noting that there are some limitations to our study. Sometimes, tourist-oriented and local-oriented establishments may overlap in terms of their target consumers, and future research could complement our proposed methodology by using surveys and establishment reviews from recommendation platforms to better classify activities and thoroughly examine the touristification phenomenon. It is also important to determine the persistence of the transition from resident-oriented to tourist-oriented activities and whether it may be influenced by factors such as urban geography and socio-demographic characteristics. The disruption caused by the COVID-19 pandemic provides a unique opportunity to evaluate the resilience of urban areas that were previously reliant on tourist amenities.

Endnotes

- 1 We will use the terms 'local business', 'resident-oriented' or 'local-oriented establishment' to refer to activities that serve the needs primarily of the local community.
- 2 In our dataset, a business premise refers to the physical property where an establishment conducts its activities. For more information about the dataset, please see Supplementary Appendix.
- 3 For example, a transition in our study would refer to a business premise that offered DVD rental services in 2014 but changed its storefront name and activity to offer

mobile phone accessories at a later date. Our dataset does not allow us to identify ownership, so it is possible that the same owner changed the focus of their business or that a new owner took over the premise.

- 4 Inside Airbnb began collecting Airbnb data for Madrid in 2015. To obtain data for 2014, we used the date of the first review as a proxy for when the listing was first opened, assuming it had not been deleted from the platform. Additionally, we applied the following filter to remove any inactive listings from our dataset: we only included listings that received at least one review in the previous year, similar to the approach taken by [Zervas et al. \(2017\)](#) and [Garcia-López et al. \(2020\)](#). Therefore, we excluded listings that did not receive a review since October 2018 for available listings in October 2019. Similarly, we dropped listings that did not receive a review since 2013 for available listings in October 2014. We chose October as our reference month to account for potential seasonal fluctuations in the number of short-term rentals in Madrid. It is important to note that while scraping programs and websites like Inside Airbnb can provide valuable insights, they also come with inherent risks and challenges, including potentially limited long-term viability.
- 5 Previous contributions in the STRs literature have relied on different aggregation measures such as census tracts ([Horn and Merante, 2017](#); [Xu and Xu, 2021](#); [Hidalgo et al., 2022b](#)), ZIP codes ([Koster et al., 2021](#); [Bekkerman et al., 2022](#); [Chen et al., 2022](#)) and neighbourhoods ([López et al., 2020](#); [Batalha et al., 2022](#)). Only a few studies have used rings as aggregation measures ([Sheppard and Udell, 2016](#); [Zou, 2020](#); [Venerandi et al., 2022](#)).
- 6 We include activity-fixed effects at the current activity level for *birth*, *death* and *transition* specifications. Conversely, we include activity-fixed effects at the previous activity level for *transition tourist* and *transition local tourist* specifications to prevent them from interfering with our dependent variable. Whenever we condition birth or death to be a tourist- or resident-oriented activity, we do not include any activity-fixed effects because of collinearity with the dependent variable.
- 7 Our imputation procedure relies on the assumption that rental homes in 2011 were evenly distributed within census tracts, which may not be accurate for some large tracts located far from the city centre but is reasonable for most tracts, which have a similar size. It is worth noting that only a few of the census tracts within the boundaries of the Madrid municipality are highlighted because of their large size and low population density, as these tracts are primarily made up of parks.
- 8 The neighbourhoods where new hotels locate are Sol, Cortes, Justicia, Universidad, Casco H. Vallecas, Castilla, Nueva España, Prosperidad, Casco Histórico de Barajas, Arguelles, Cuatro Caminos and Recoletos.
- 9 The list of gentrification activities can be found in [Supplementary Table AV](#) in the Supplementary Appendix.

That classification comprises mainly leisure amenities and cultural and creative sectors. It is important to bear in mind that the classification above is based on Behrens et al. (2022), who focus on a different context and time frame (NY 2000–2010).

- 10 The non-tradable resident-oriented establishments are: textile laundry, tailor, furnishing services, hairdresser, beauty and depilation salon, driving and nursery school.

Supplementary material

Supplementary material is available at *Cambridge Journal of Regions, Economy and Society* online.

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