

Which Neighborhoods Join the Sharing Economy and Why?

- The Case of the Short-term Rental Market in New York City*

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Abstract

As the sharing economy has emerged, the short-term rental market has grown. The difference between casual and commercial short-term rental operators is important but seldom discussed. Short-term rental platforms help casual operators earn extra income, bringing benefits to local residents. On the contrary, commercial operators impose burdens on local residents, because they decrease the long-term rental supply, further exacerbating the housing affordability issue. In order to understand which neighborhoods in New York City are experiencing such benefits and burdens of short-term rental use, this paper uses data from Inside Airbnb, American Community Survey (ACS), and Department of City Planning (PLUTO), and finds within central areas, neighborhoods with lower long-term rents bear greater burdens from commercial short-term rental use. In addition, neighborhoods with higher black and Hispanic population share less benefits from casual short-term rental use.

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1 Introduction

The sharing economy describes the digital platforms obtaining, giving, and sharing the access to goods and services (Hamari, Sjöklint, and Ukkonen, 2016). As the sharing economy emerged, short-term rental platforms have grown, such as Airbnb, Homeaway, VRBO and Couch-surfing (Filippas and Horton, 2017). Short-term rental units are residential units that are rented out for less than 30 continuous days. The rapid growth of the short-term rental market has challenged a variety of existing housing regulation, from zoning laws to accommodation tax policies. Local governments are adopting a range of short-term rental regulatory responses. For example, New York City prohibits entire home ¹ short-term rental units in multiple dwelling buildings², according to New York State Multiple Dwelling Law³. San Francisco limits entire home short-term rental units to a maximum of 90 days per year, and requires both entire home and private/shared room hosts to register for permits (Fishman, 2018).

The short-term rental market has been controversial in New York City and elsewhere. Proponents claim that the short-term rental market takes advantage of underutilized housing resources, offers short-term rental operators additional income, and expands visitors accommodation choices (Sundararajan, 2016; Horton and Zeckhauser, 2016). Critics believe the short-term rental market causes negative externalities, like noise, disruption, and safety concerns (Gurran and Phibbs, 2017). More importantly, critics also fear that the short-term rental market incentivizes commercial operators to convert long-term rental units to short-term rental units, exacerbating the housing affordability issue (Lee, 2016).

The difference between casual and commercial short-term rental operators is important but seldom discussed. Casual short-term rental operators host visitors when the primary residences are not fully occupied, so casual operators efficiently use underutilized housing resources. On the contrary, commercial operators remove long-term rental units

¹entire homes are short-term rental units without the presence of hosts

²multiple dwelling buildings are residential buildings with three or more residential units

³See <https://www1.nyc.gov/assets/buildings/pdf/MultipleDwellingLaw.pdf> for regulation details

for short-term rental use. They could be landlords who welcome short-term renters rather than sign long-term rental contracts with residents; or investors who purchase/rent housing units for returns from the short-term rental market. Both casual and commercial short-term rental units should raise the willingness-to-pay for housing because of the additional income generated by the short-term rental market (Sheppard and Udell, 2016). However, commercial short-term rental units decrease the long-term rental supply, further exacerbating the long-term rental affordability issue. Barron, Kung, and Proserpio (2017) suggest a 10% increase in Airbnb listings leads to a 0.39% increase in long-term rents and a 0.64% increase in housing sales prices. This concern is particularly prevalent in supply-constrained cities like New York City, which is the most popular destination for Airbnb in the United States. Transferring money from rent-burdened residents to commercial short-term rental operators who convert long-term rental units to short-term rental units may exacerbate the housing affordability issue, and regulatory intervention may help address this concern (Edelman and Geradin, 2015).

Short-term rental platforms help casual operators earn extra income, bringing benefits to local residents. On the contrary, commercial operators impose burdens on local residents, because they decrease the long-term rental supply, further exacerbating the housing affordability issue. This paper aims to figure out which neighborhoods in New York City are experiencing such benefits and burdens of short-term rental use. In 2016, 1% of NYC households operated casual short-term rental units, and 0.14% of NYC housing units were converted to commercial entire home short-term rental units⁴. I use data from Inside Airbnb, American Community Survey (ACS), and the Department of City Planning (PLUTO) for New York City in 2016 and find:

- Within central areas, neighborhoods with lower long-term rents bear greater burdens from commercial short-term rental use. This is expected because commercial operators pay long-term rents as opportunity costs, and so they are motivated to remove long-

⁴According to Inside Airbnb, NYC has 28,788 casual Airbnb operators, and 4,698 commercial entire home Airbnb listings in 2016.

term rental units in neighborhoods with lower long-term rents, holding short-term rental revenue constant.

- Neighborhoods with higher black and Hispanic population share less benefits from casual short-term rental use. In other words, residents in these neighborhoods are less likely to operate casual entire home short-term rental units.

This paper relates to a growing literature on the distributional outcome of the short-term rental market. Some researchers claim that black short-term rental operators benefit less from the short-term rental platform due to discrimination (Edelman and Luca, 2014). Farronato and Fradkin (2016) argue married households are less likely to join the short-term rental market because children increase the adults perceived risk to host strangers. At the neighborhood level, Quattrone et al (2016) scrape Airbnb publicly available data in London from 2012 to 2015, in order to figure out where and when Airbnb listings are offered. They find the importance of centrality as the predictor of Airbnb listing location, but it becomes less predominant year after year. They show the number of Airbnb listings has been growing in neighborhoods with lower income and lower percentages of homeowners. In 2017, Coles, et al. analyze Airbnb private data in NYC from 2011 to 2016. They find the usage has become more geographically dispersed, though still highly concentrates in Manhattan and Brooklyn. They also find middle-income neighborhoods have grown in popularity, and disproportionately feature private/shared room listings rather than entire home listings. When Gurran and Phibbs (2017) analyze Airbnb publicly available data in Sydney, they suggest that short-term rental listings highly concentrate in popular tourism neighborhoods.

This paper makes three contributions to existing literature. First, I shed light on the difference between casual and commercial short-term rental units. Second, I analyze and compare the characteristics of neighborhoods where casual and commercial short-term rental units are most common. Third, I propose potential short-term rental regulations to limit commercial operation, without discouraging casual operators.

The rest of this paper is organized as follows. In section 2, I introduce the data

source - Inside Airbnb, and show the descriptive statistics. Section 3 discusses two hypotheses about commercial and casual short-term rental use across neighborhoods. In section 4, I present regression results for casual and commercial entire home short-term rental units. Section 5 concludes the paper with policy recommendation.

2 Data Description

2.1 Inside Airbnb

Airbnb is a sharing-economy platform for people to lease or rent short-term rental units. The company was founded in 2008, and headquartered in San Francisco, California. In 2016, it had over 2,000,000 listing in 34,000 cities and 191 countries. In this paper, I use 2016 New York City Airbnb publicly available data collected by Inside Airbnb to conduct empirical analysis. Inside Airbnb is a non-commercial website which provides point-in-time information about Airbnb worldwide listings⁵. The data has been used by authors of several papers (Horn and Merante, 2017; Gurran and Phibbs, 2017; Kakar, et al. 2016; Seg, 2018).

Inside Airbnb scraped the Airbnb NYC website once per month in 2016 (excluding March). The scraping algorithm collects the listing price, the room type, the last review date, etc. I combine the eleven scraping datasets and drop duplicate listings. According to the combined data, there were 72,552 advertised listings in 2016, but some of them were outdated or accidentally created. Therefore, I keep only listings with at least one review in 2016, and so there were 42,703 active listings - 52.8% were entire home listings, and 51.2% were in Manhattan. According to the data released by Airbnb, there were 45,260 active listings as of December 1st, 2016 in NYC - 51.8% were entire home listing, and 49.3% were in Manhattan⁶. The small difference between these two datasets is caused by the fact that

⁵See <http://insideairbnb.com/get-the-data.html> for details

⁶The data is from "One Host, One home: New York City (December Update)", see <https://2sqy5r1jf93u30kwzc1smfqt-wpengine.netdna-ssl.com/wp-content/uploads/2016/12/Data-Release-December-2016-Writeup-1.pdf>

Inside Airbnb fails to collect some very casual listings. These listings were either unavailable during the 11 scraping times, or their guests did not leave any review. According to Airbnb CEO Brian Chesky, 72% of Airbnb guests submit reviews about their hosts⁷.

Inside Airbnb offers the latitude and longitude coordinates of NYC Airbnb listing locations. However, location information is anonymized by Airbnb, and so the latitude and longitude coordinate collected by Inside Airbnb is several meters away from the actual address⁸. I use ArcGIS to link the coordinates to their census tracts, as shown in Figure 1.

2.2 Distinguish between casual and commercial short-term rental units

Of the 33,895 Airbnb hosts in 2016, 84.9% operated only one listing, 10.4% operated two listings, and 4.63% operated more than two listings in New York City. I categorize the 28,788 Airbnb listings whose hosts have only one listing as casual short-term rental units, and all other Airbnb listings as commercial short-term rental units. According to this categorization, 33% of 2016 NYC Airbnb listings were commercial, and 21% of entire home Airbnb listings were commercial. This categorization likely overestimates the number of commercial entire home short-term rental units, because only ten percents of Airbnb entire home listings were rented more than 180 days in 2016 (Coles, et al. 2017).

I use this categorization for two reasons. First, it is obvious that Airbnb hosts with more than one listing are much more likely to be commercial operators than Airbnb hosts with only one listing. Though some commercial operators might have only one short-term rental unit, it is highly unlikely that casual operators have more than one short-term rental unit. Second, in 2015 Los Angeles report⁹, Airbnb uses the number of booked nights

⁷Quora answered by Brian Chesky, see <https://www.quora.com/What-percent-of-Airbnb-hosts-leave-reviews-for-their-guests>

⁸See <http://insideairbnb.com/about.html> for details

⁹REPORT: Housing and The Airbnb Community in the City of Los Angeles, 2015. See: <http://1zxiw0vqx0oryvpz3ikczauf-wpengine.netdna-ssl.com/wp-content/uploads/2015/09/HousingtheAirbnbCommunityintheCityofLosAngeles.pdf>

to distinguish between casual and commercial short-term rental units, but the number of booked nights is not available in publicly available data.¹⁰

Table 1 presents the number of Airbnb listings by category and borough. In 2016, there were 1%¹¹ of New York City households operated casual short-term rental units, and 0.14%¹² of NYC housing units were converted to commercial entire home short-term rental units. Figure 2 and figure 3 show the number of casual and commercial entire home Airbnb listings by NYC census tract in 2016 separately. Centrality is an important factor to predict locations of both casual and commercial entire home short-term rental units, and casual short-term rental units were more geographically dispersed than commercial short-term rental units.

2.3 Summary statistics

In addition to 2016 Inside Airbnb data, I use New York City neighborhood features from 2012-2016 American Census Survey (ACS) 5-year estimates. I also use building characteristics from 2016 PLUTO, which is provided by the Department of City Planning (DCP). As for long-term rents in 2016, I use the average of 2016 monthly Zillow Rent Index by NYC census tract. Zillow Rent Index is created by Zillow using proprietary statistical and machine learning models.¹³

I restrict the sample to NYC census tract with more than 50 housing units, and table 2 shows the summary statistics by census tract. In order to control the short-term rental revenue using the median entire home short-term rental price per night by census tract, I further restrict the sample to census tract with more than two Airbnb entire home short-term rental units in 2016. Table 3 shows the summary statistics for regressions in

¹⁰Though Inside Airbnb tries to estimate the booked nights using the calendar, the number of reviews, and the minimum stay length, the estimation is not consistent with the number reported by Airbnb, see Inside Airbnb San Francisco Model at <http://insideairbnb.com/about.html>

¹¹It is calculated as the number of casual short-term rental units 28,788 divided by the number of NYC households 3,114,811

¹²It is calculated as the number of commercial entire home short-term rental units 4,678 divided by the number of NYC housing units 3,436,084

¹³See <https://www.zillow.com/research/zillow-rent-index-methodology-2393/> for details

Section 4. Most of these 727 census tracts are in NYC central areas.

3 Hypotheses about Commercial and Casual Short-term Rental Use

In order to figure out commercial short-term rental units are more concentrated in what kind of neighborhoods, compared to casual short-term rental units, I calculate the ratio of the number of commercial entire homes to the sum of the number of commercial entire homes and the number of casual entire homes by census tract¹⁴. Figure 4 shows how this commercial ratio varies across NYC in 2016 - compared with casual short-term rental units, commercial short-term rental units were less concentrated in Manhattan. Only 19.3% of entire home short-term rental units were commercial in Manhattan, but the percentage was 22.5% in Brooklyn and 24.4% in Queens. This is consistent with the finding from Coles, et al. (2017), that the commercial short-term rental activity was least profitable in Manhattan¹⁵.

I have two hypotheses about the commercial and casual short-term rental use. First, neighborhood with lower long-term rents might have to bear greater burdens from commercial short-term rental use. Commercial operators pay long-term rents as short-term rental opportunity costs. If the commercial operator owns the housing unit, she gives up the long-term rental revenue from the long-term rental market; If the commercial operator rents or buys the housing unit, she pays the long-term rent to operate the short-term rental unit. In order to make higher profit, commercial operators are motivated to convert long-term rental units with lower long-term rents to commercial short-term rental units, holding the short-term rental revenue constant. On the contrary, long-term rents are sunk cost to casual

¹⁴I don't analyze private/shared rooms short-term rental units in this section, because it is not clear how many private/shared rooms belong to a housing unit. The number of housing units converted to commercial private/shared room short-term rental units is unknown.

¹⁵In Manhattan, the average unit would have needed 237 days as a short-term rental unit to match the annual average revenue it would have earned as a long-term rental unit, which is higher than Brooklyn and Queens whose average break-level is 190 days

operators, because they operate casual short-term rental units at their primary residences. In other words, commercial short-term rental units could be more concentrated in lower-rent areas as compared to casual short-term rental units. This pattern is shown in figure 5.

Second, predominantly black and Hispanic neighborhoods might share less benefits from casual short-term rental use. Airbnb shows operators' pictures, and so it could be more challenging for black residents to attract customers and earn extra income from Airbnb as casual operators (Edelman and Luca, 2014). In addition, black and Hispanic residents disproportionately occupy overcrowded and deteriorated housing units (Schill, Friedman, and Rosenbaum 1998; Rosenbaum, et al 1999), which are less likely to have decent spare housing resource for casual short-term rental use. However, a white commercial operator won't be bothered by either of these two issues if she operates commercial short-term rental units in minority neighborhoods. Table 4 presents neighborhoods characteristics of 15 sub-borough areas ¹⁶with more than 100 commercial entire home short-term rental units. As the neighborhood with 49% blacks and 17% Hispanics, Bedford Stuyvesant has the highest commercial ratio - one third of its entire home short-term rental units are commercial. On the contrary, in Upper West Side, where 70% of population are white, only 14% of entire home short-rental units are commercial.

¹⁶Sub-borough Areas are groups of census tracts summing to at least 100,000 residents, determined by the New York City Department of Housing Preservation and Development. See <http://a816-dohbesp.nyc.gov/IndicatorPublic/EPHTPDF/subboro.pdf> for details

4 Empirical Analysis

4.1 Empirical strategy

In order to test above hypotheses, I run the following regressions:

$$\frac{\# \text{ of commercial entire homes}_i}{\# \text{ of total entire homes}_i} = \alpha + \beta_1 \text{rent}_i + \beta_2 \text{race}_i + \beta_3 \text{building}_i + \beta_4 \text{price}_i + \beta_5 \text{control}_i \quad (1)$$

$$\frac{\# \text{ of commercial entire homes}_i}{\# \text{ of total housing units}_i} = \vartheta + \lambda_1 \text{rent}_i + \lambda_2 \text{race}_i + \lambda_3 \text{building}_i + \lambda_4 \text{price}_i + \lambda_5 \text{control}_i \quad (2)$$

$$\frac{\# \text{ of casual entire homes}_i}{\# \text{ of total housing units}_i} = \zeta + \eta_1 \text{rent}_i + \eta_2 \text{race}_i + \eta_3 \text{building}_i + \eta_4 \text{price}_i + \eta_5 \text{control}_i \quad (3)$$

where *rent* is Zillow long-term rent index by census tract; *race* includes the percentage of black people and the percentage of Hispanic people by census tract; *building* includes the percentage of residential units in multiple dwelling buildings and the percentage of residential units in co-op buildings by census tract; *price* is the Airbnb median price for entire homes by census tract; and *control* includes the distance to the Empire State Building, Manhattan, Brooklyn, and Queens dummy variables.

4.2 Empirical result

First, as shown in column (1) and (2) of table 5, the coefficients for long-term rents are significantly negative, which indicate commercial operators are more likely to have short-term rental units in neighborhoods with lower long-term rents. On the contrary, holding short-term rental revenue constant, casual entire home short-term rental use is not correlated with long-term rents, which is confirmed by the coefficient of long-term rents in column (3).

Second, the significantly positive coefficients for % of black and % of Hispanic in column (1) indicate that entire home short-term rental units in neighborhoods with higher

percentages of black and Hispanic people are more likely to be commercial. This is because residents in neighborhoods with higher percentages of black and Hispanic people are less likely to operate casual entire home short-term rental units, as showed in column (3), but commercial short-term rental use is not correlated with the neighborhood's racial percentages.

Third, the negative coefficients for % of co-op residential units in column (2) and (3) show neighborhoods with higher percentages of co-op residential units have fewer commercial and casual entire home short-term rental units. Perhaps because co-op boards strictly prohibit short-term rental activity (Dobbins, 2017), and so operating short-term rental units can have significant legal and financial consequences. In addition, the negative coefficient in column (1) and (2) for % of multiple dwelling indicate that entire home short-term rental units in neighborhoods with higher percentages of residential units in multiple dwellings are less likely to be commercial. NYC Office of Special Enforcement inspects short-term rental units in multiple dwelling buildings through 311 complaints, and issues fine to the operators (Carman, 2017). Commercial operators might be threatened by the inspection, and disincentivised to have short-term rental units in multiple dwelling buildings.

5 Discussion

This paper highlights the difference between commercial and casual short-term rental units, as well as analyzes and compares their usage across neighborhood. Within NYC central areas, commercial short-term rental units are more common in neighborhoods with lower long-term rents. Neighborhoods with higher percentages of black and Hispanic people have fewer casual short-term rental units.

Commercial operators removed 0.14% of NYC housing units to commercial entire home short-term rental units in 2016, and they might remove more housing units and cause a housing affordability crisis in the future. New Yorkers have been suffering from rapid grow-

ing long-term rents, and commercial short-term rental activities might worsen the housing affordability issue. Additionally, the empirical results suggest that within central areas, long-term rental units in neighborhoods with lower long-term rents and higher percentages of black and Hispanic people are under higher risk to be removed by commercial short-term rental operators. Therefore, it is critical for New York City to consider protecting long-term rental units in these neighborhoods. The city government could concentrate their short-term rental regulation enforcement power in these neighborhoods.

In addition, New York City should also reconsider the NYS Multiple Dwelling Law, which prohibits entire home short-term rental units in buildings with more than two residential units. This law fails to distinguish between commercial and casual short-term rental activities. Instead, New York City should adopt regulations which limit commercial operation, without discouraging casual operators. A good example is the city of Portland, which sets registration fees increase with the number of short-term rental units operated by a host (Billings 2017). The registration fee is disproportionately higher for commercial operators, who have multiple short-term rental units. Another approach is imposing a cap on annual number of nights a resident can rent out their primary residences for the short-term rental use. In Philadelphia¹⁷, short-term rental operators may share their home for up to 90 nights a year without permit, but they must pay 125 dollars to obtain registration permits if the booked nights are between 91 and 180, and must further secure a Visitor Accommodations registration permit if the booked nights are more than 180 nights. However, enforcement of the short-term rental cap requires cooperation of all short-term rental platforms, because the government can't capture the number of booked nights using publicly available data. The local government should delegate more responsibility to short-term rental platforms, treating them as partners rather than enemies (Sundararajan, 2018).

A natural direction for future work would be estimating the social welfare generated by casual and commercial short-term rental operators separately. In order to achieve this,

¹⁷For review of the regulation, see <http://www.phila.gov/li/PDF/Limited%20Lodging%20Information%20Flyer.pdf>

researchers are expected to estimate and compare the impact of casual and commercial short-term rental units on housing prices, local businesses, and neighborhood environment (such as noise and congestion).

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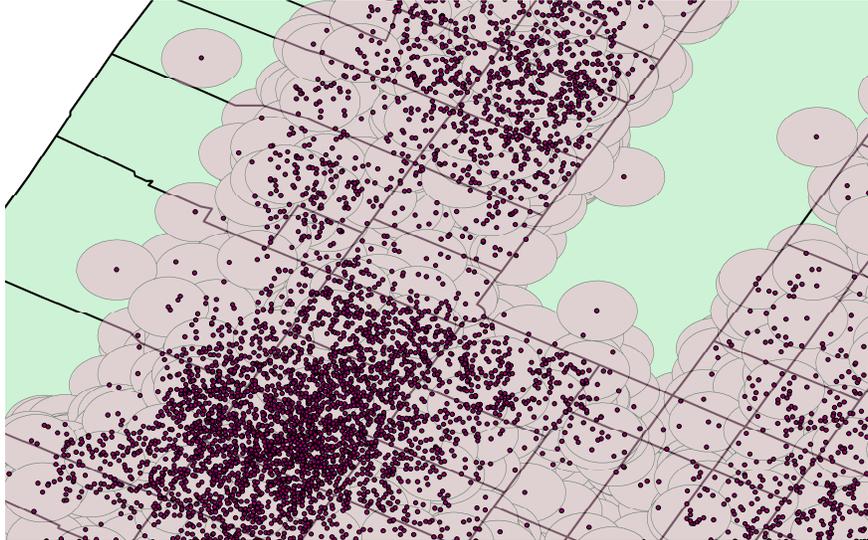
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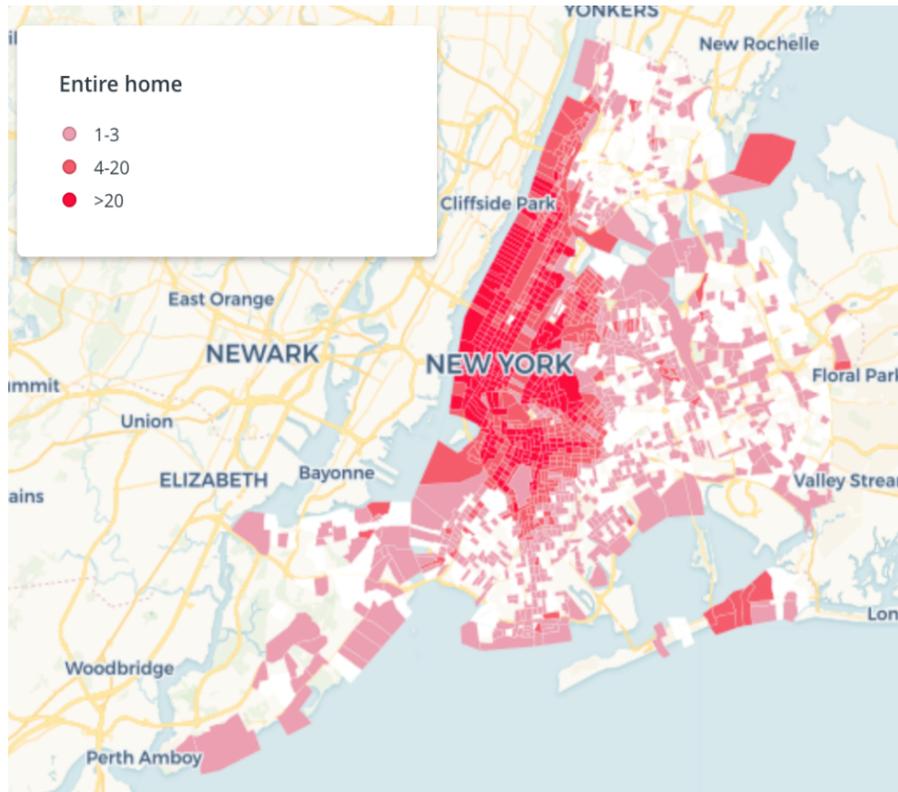
Figures

Figure 1: The 150-meter Buffer ArcGIS Shapefile of Midtown Manhattan



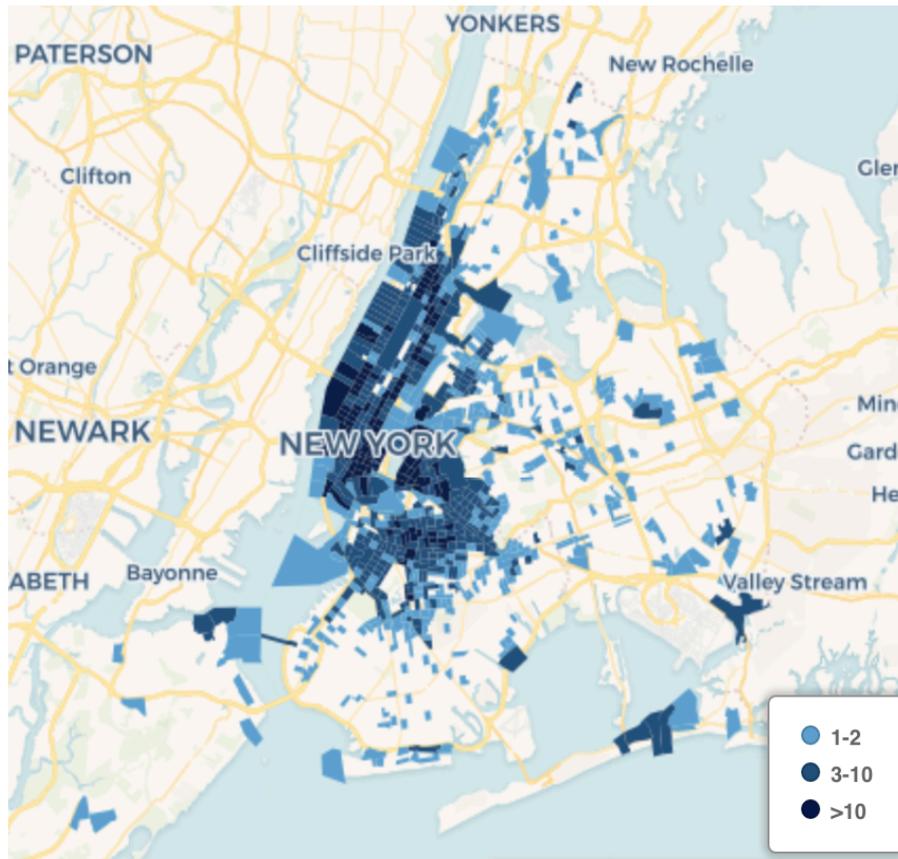
Note: The latitude and longitude coordinate is from Inside Airbnb. The census tract boundary is from United State Census Bureau

Figure 2: NYC Airbnb Casual Entire Home Listings by Census Tract, 2016



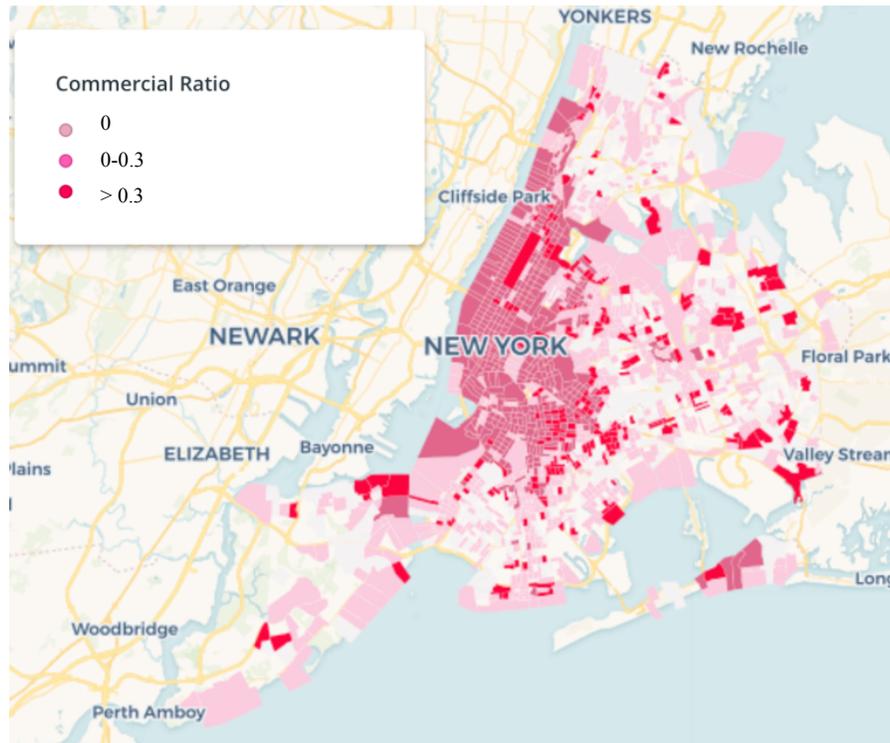
Note: Airbnb casual entire home listings are Airbnb entire home listings whose operators have only one listing. The data is from Inside Airbnb.

Figure 3: NYC Airbnb Commercial Entire Home Listings by Census Tract, 2016



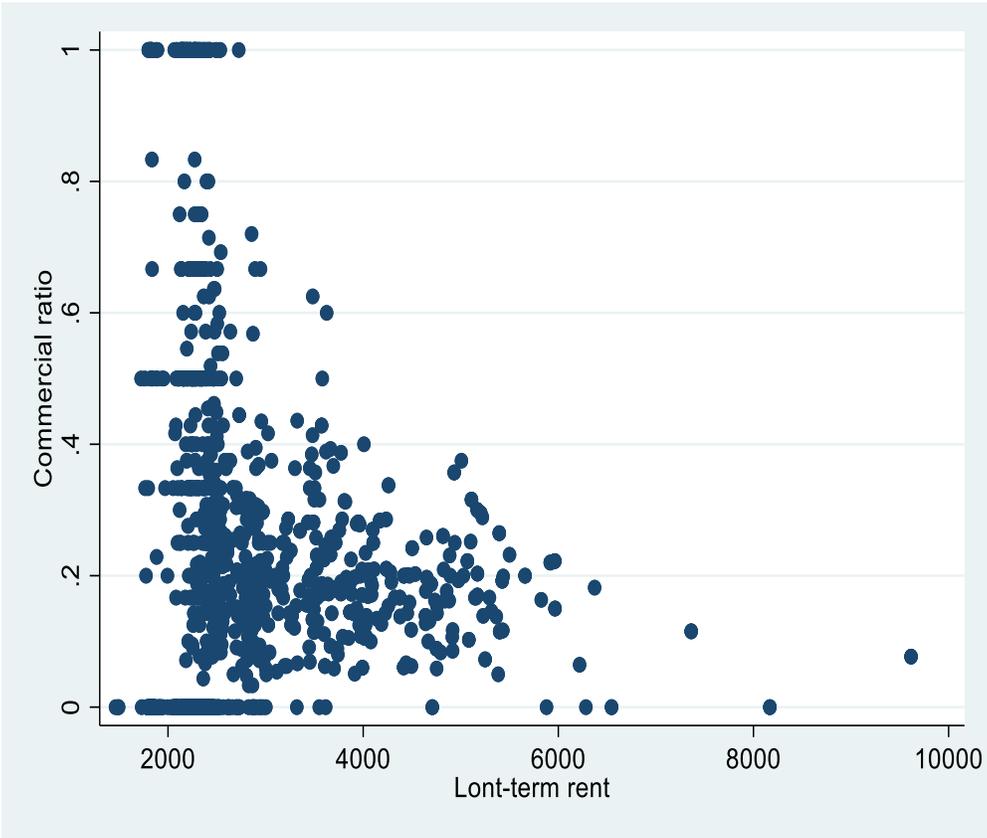
Note: Airbnb commercial entire home listings are Airbnb entire home listings whose operators have more than one listing. The data is from Inside Airbnb.

Figure 4: The Commercial Ratio by Census Tract, 2016



Note: The commercial ratio is calculated as the number of commercial entire homes to the sum of the number of commercial entire homes and the number of casual entire homes by census tract. Casual Airbnb listings are Airbnb listings whose operators have only one listing. Commercial Airbnb listings are Airbnb listings whose operators have more than one listing. The data is from Inside Airbnb.

Figure 5: The Negative Correlation Between the Commercial Ratio and Long-term Rents



Note: The commercial ratio is calculated as the number of commercial entire homes to the sum of the number of commercial entire homes and the number of casual entire homes by census tract. Casual Airbnb listings are Airbnb listings whose operators have only one listing. Commercial Airbnb listings are Airbnb listings whose operators have more than one listing. The Airbnb data is from Inside Airbnb. The long-term rents are 2016 Zillow Rent Index.

Tables

Table 1: The Number of NYC Airbnb Listings by Category, 2016

	Casual Entire Home	Commercial Entire Home	Casual Private/shared Room	Commercial Private/shared Room	Total
Bronx	131	57	218	230	636
% of NYC	0.73%	1.21%	1.99%	2.50%	1.49%
Brooklyn	5,917	1,718	4,594	4,039	16,268
% of NYC	33.18%	36.57%	41.93%	43.82%	38.10%
Manhattan	10,675	2,556	4,994	3,633	21,858
% of NYC	59.86%	54.41%	45.58%	39.42%	51.19%
Queens	1,052	341	1,099	1,235	3,727
% of NYC	5.90%	7.26%	10.03%	13.40%	8.73%
Staten Island	57	26	51	80	214
% of NYC	0.32%	0.55%	0.47%	0.87%	0.50%
NYC	17,832	4,698	10,956	9,217	42,703

Note: Casual Airbnb listings are Airbnb listings whose operators have only one listing. Commercial Airbnb listings are Airbnb listings whose operators have more than one listing. The Airbnb data is from Inside Airbnb.

Table 2: Summary Statistics¹ – NYC Census Tracts, 2016

Variable	Observation	Mean	Std. Dev.	Min	Max
Airbnb					
% of (Commercial Entire Homes/Total Entire Homes)	1,288	0.2357237	0.2869555	0	1
% of (Commercial Entire Homes/Total Housing Units)	2,103	0.0011741	0.0029112	0	0.0555556
% of (Casual Entire Homes/Total Housing Units)	2,103	0.0040387	0.0092417	0	0.1759259
Median Price of Entire Home Airbnb Listings ²	777	143.3095	42.31117	42.5	350
Neighborhood Features					
% of Black	2,103	0.2406721	0.2975583	0	0.9822718
% of Hispanic	2,103	0.2663757	0.2269733	0	1
Building Characteristics					
% of residential units in multiple dwelling buildings ³	2,103	0.6016352	0.3339209	0	1
% of residential units in co-op buildings	2,090	0.091074	0.166299	0	1
distance to Empire State Building (km)	2,102	12.55999	5.596872	0.2064373	37.46392
Manhattan Dummy	2,103	0.1321921	0.3387801	0	1
Brooklyn Dummy	2,103	0.3556824	0.4788334	0	1
Queens Dummy	2,103	0.3048027	0.4604333	0	1
Long-term Rents					
Zillow Rent Index	1,993	2471.783	729.8387	1462	9615

Note: Casual Airbnb listings are Airbnb listings whose operators have one listing. Commercial Airbnb listings are Airbnb listings whose operators have more than one listing. The Airbnb data is from Inside Airbnb, the neighborhood features are from 2012-2016 American Census Survey (ACS) 5-year estimates, the building characteristic is from 2016 PLUTO, and 2016 Zillow Rent Index is from Zillow.

¹ The sample includes census tracts with more than 50 housing units

² Includes census tracts with more than two entire home short-term rental units

³ multiple dwelling buildings are buildings with more than two residential units

Table 3: Summary Statistics for Regressions⁴ – NYC Census Tracts, 2016

Variable	Observation	Mean	Std. Dev.	Min	Max
Airbnb					
% of (Commercial Entire Homes/Total Entire Homes)	727	0.2414378	0.193483	0	1
% of (Commercial Entire Homes/Total Housing Units)	727	0.0030207	0.0042247	0	0.0555556
% of (Casual Entire Homes/Total Housing Units)	727	0.0102781	0.0125876	0	0.1759259
Median Price of Entire Home Airbnb Listings	727	142.2022	40.65612	42.5	320
Neighborhood Features					
% of Black	727	0.2236311	0.2850246	0	0.9545455
% of Hispanic	727	0.23889	0.2007407	0.0059835	0.9246862
Building Characteristics					
% of residential units in multiple dwelling buildings ⁵	727	0.8084402	0.2046012	5.33E-17	1
% of residential units in co-op buildings	727	0.1242993	0.1689393	0	1
distance to Empire State Building (km)	727	8.006933	4.444673	0.2064373	24.22329
Manhattan Dummy	727	0.3204952	0.4669882	0	1
Brooklyn Dummy	727	0.4621733	0.4989103	0	1
Queens Dummy	727	0.1856946	0.3891278	0	1
Long-term Rents					
Zillow Rent Index	727	2984.791	932.5597	1765	8168

Note: Casual Airbnb listings are Airbnb listings whose operators have one listing. Commercial Airbnb listings are Airbnb listings whose operators have more than one listing. The Airbnb data is from Inside Airbnb, the neighborhood features are from 2012-2016 American Census Survey (ACS) 5-year estimates, the building characteristic is from 2016 PLUTO, and 2016 Zillow Rent Index is from Zillow.

⁴ The sample only includes census tracts with more than two entire home listings and available Zillow Rent Index

⁵ multiple dwelling buildings are buildings with more than two residential units

Table 4: Neighborhood Characteristics for 15 Sub-borough Areas⁶

Sub-Borough Area	# of Commercial Entire Home	Commercial Ratio ⁷	Long-term Rents	% of Black	% of Hispanic	% of White
Upper West Side	162	0.1361345	2199.22	5.4%	13.1%	69.6%
Upper East Side	172	0.1402936	2294.04	2.3%	12.1%	72.7%
Park Slope/Carroll Gardens	119	0.1590909	2072.79	9.9%	14.3%	64.4%
Greenwich Village/Financial District	372	0.1608997	2583.6	1.8%	5.7%	75.8%
Brooklyn Heights/Fort Greene	206	0.1747243	1820.96	24.5%	12.5%	48.6%
Astoria	108	0.2049336	1558.93	6.4%	26.5%	47.9%
Stuyvesant Town/Turtle-Bay	257	0.2072581	2582.58	2.4%	7.3%	72.1%
Lower East Side/Chinatown	503	0.211968	1070.55	8.9%	22.4%	33.2%
Chelsea/Clinton/Midtown	578	0.2125	2275.69	4.3%	12.7%	61.2%
Williamsburg/Greenpoint	443	0.2127762	1774.06	3.8%	23.5%	64.5%
North Crown Heights/Prospect Heights	179	0.2245922	1385.6	56.2%	12.1%	23.5%
Central Harlem	185	0.2696793	1011.42	52.8%	26.7%	13.3%
Bushwick	194	0.2957317	1432.5	19.6%	55.4%	17.5%
East Harlem	157	0.3066406	893.15	30.3%	43.5%	15.9%
Bedford Stuyvesant	280	0.3233256	1317.29	49.0%	17.0%	26.0%

Note: Commercial Airbnb listings are Airbnb listings whose operators have more than one listing. The Airbnb data is from Inside Airbnb. The 2016 long-term rents and racial percentages are from NYU Furman Center CoreData⁸.

⁶ These 15 sub-borough neighborhoods are neighborhoods whose commercial entire home Airbnb listings are more than 100. Sub-borough neighborhoods are groups of census tracts summing to at least 100,000 residents, determined by the New York City Department of Housing Preservation and Development.

⁷ % of (# of Commercial Entire Homes/(# of Commercial Entire Homes + # of Casual Entire Homes))

⁸ coredata.nyc

Table 5: Empirical Results for NYC Airbnb Listings, 2016

	(1) Commercial Ratio ⁹	(2) % of Commercial to Housing Units ¹⁰	(3) % of Casual to Housing Units ¹¹
Long-term rents	-2.78e-05* (1.61e-05)	-6.31e-07* (3.42e-07)	2.08e-09 (9.44e-07)
% of black	0.152*** (0.0295)	8.93e-05 (0.000625)	-0.00510*** (0.00173)
% of Hispanic	0.230*** (0.0393)	-0.000189 (0.000833)	-0.00663*** (0.00230)
% of co-op residential units	-0.0527 (0.0461)	-0.00476*** (0.000976)	-0.0143*** (0.00270)
% multiple dwelling	-0.225*** (0.0465)	-0.00187* (0.000986)	0.000997 (0.00272)
median price of entire home	0.000569** (0.000256)	2.12e-05*** (5.42e-06)	6.56e-05*** (1.50e-05)
Empire State Building (km)	-0.00317 (0.00241)	-0.000338*** (5.11e-05)	-0.000873*** (0.000141)
Manhattan	0.0117 (0.0494)	0.000161 (0.00105)	-0.00123 (0.00289)
Brooklyn	-0.0324 (0.0411)	0.000132 (0.000870)	0.00116 (0.00240)
Queens	0.00139 (0.0421)	-0.00141 (0.000892)	-0.00452* (0.00247)
Constant	0.379*** (0.0852)	0.00688*** (0.00181)	0.0123** (0.00499)
Observations	727	727	727
R-squared	0.150	0.199	0.312

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Commercial entire home Airbnb listings are entire home Airbnb listings whose operators have more than one listing. Casual entire home Airbnb listings are entire home Airbnb listings whose operators have one listing. The Airbnb data is from Inside Airbnb, the neighborhood and housing feature are from 2012-2016 American Census Survey (ACS) 5-year estimates, the building characteristic is from 2016 PLUTO, and Zillow Rent Index is from Zillow.

⁹ % of (# of Commercial Entire Homes/(# of Commercial Entire Homes + # of Casual Entire Homes))

¹⁰ % of (# of Commercial Entire Homes/# of Total Housing Units)

¹¹ % of (# of Casual Entire Homes/# of Total Housing Units)