

The paradox of airbnb, crime and house prices: A reconciliation

Tourism Economics
2023, Vol. 29(5) 1412–1418
© The Author(s) 2022
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/13548166221102808
journals.sagepub.com/home/teu



Ka Shing Cheung 

The University of Auckland, New Zealand

Chung Yim Yiu 

The University of Auckland, New Zealand

Abstract

While in many housing studies, Airbnb is evidenced to be a demand driver that leads to a positive effect on property rents and prices, it is also argued that such tourist accommodation in a neighbourhood causes an increase in criminal activities that weigh on its property values. How can we reconcile such contradictory arguments? This research note aims to use a difference-in-differences model to empirically disentangle the moderating effect of Airbnb on the relationship between crime and house prices. Using the housing transaction data in the two census years of the Auckland Region, New Zealand, we demonstrate that the impact of crime on house prices is contingent on the density of Airbnb. After controlling neighbourhood qualities, such as household incomes, ethnicity concentration and proportion of public housing in each census tract, the effect of crime rate on house prices is negatively moderated by the number of Airbnb listings, especially in apartment-type housing. The result can be interpreted as showing the effects of trespassing-related crime on house prices.

Keywords

Airbnb density, neighbourhood crime rate, moderating effect, housing price differential, hedonic model

Introduction

In tourism studies, a regular research focus relating to many destinations has been how much tourist areas are prone to criminal activities (Brunt et al., 2000). On the one hand, a consensus has arisen that the *‘lodging industry, especially Airbnb, breeds tourism-related crime’*. Airbnb-related crime is often characterised by property-related crimes such as robbery, burglary and theft (Xu et al., 2017).

Corresponding author:

Ka Shing Cheung, University of Auckland Business School, Sir Owen G. Glenn Building, 12 Grafton Road, Auckland 1142, New Zealand.

Email: william.cheung@auckland.ac.nz

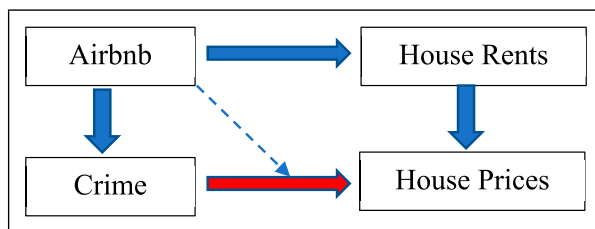


Figure 1. Moderating effect of airbnb on crime rate effect on house prices.

Notes. In the Airbnb-related literature, the crime rate is usually found to have a negative effect on house prices, while Airbnb is found to have a positive effect on house rents, which will in turn impose a positive effect on house prices. On the other hand, Airbnb is also suggested to have a positive association with the crime rate due to an erosion of local anti-crime social dynamics. The signs of the two effects cannot be reconciled. However, Airbnb can impose a moderating effect on the crime rate effect on house price, as indicated by the dotted arrow.

Biagi and Detotto (2014) bluntly proposed that crime is a by-product of tourism. Given that tourists are easy targets for criminals (Dimanche and Lepetic, 1999; De Albuquerque and McElroy, 1999), shared lodgings are typically more prevalent in tourist-concentrated neighbourhoods, and these are more prone to criminal activities (Mehmood et al., 2016).

On the other hand, in most housing studies literature, Airbnb is considered to be a demand driver that buoys up the housing market. Much housing studies research has confirmed a positive association between Airbnb and house prices and/or rents in the same neighbourhood, based on the argument that Airbnb is a demand driver (Horn and Merante, 2017; Leick et al., 2021; Sheppard and Udell, 2016; Todd et al., 2022). Several empirical studies have also confirmed such an effect. For example, Barron et al. (2021) looked at the impact of Airbnb on house rents and prices for all cities in the United States. They estimated that a one per cent increase in Airbnb listings would lift rents by 0.018% and prices by 0.026%. Garcia-López et al. (2020) focused on a different effect of Airbnb on housing markets, and they suggested that for the average neighbourhood, Airbnb activities have increased rents by 1.9%, transaction prices by 4.6% and listing prices by 3.7%.

Even though one could argue that these two opposite forces compete with each other, there is limited literature in tourism economics that seeks to reconcile the concepts. The contribution of this research note is twofold. First, this study is an initial attempt to reconcile two seemingly contradictory observations, using the notion of moderating effects. Second, a better understanding of how the impact of Airbnb interacts with criminal activities and housing prices in a neighbourhood should be conducive to formulating effective policies including zoning (Yiu & Cheung, 2021), to regulate the short-term accommodation market in many global tourism cities.

The paradox: Airbnb, crime and house prices

When the arguments ‘Airbnb breeds tourism-related crime’ and ‘Airbnb buoys up housing markets’ are each viewed alone, they both sound reasonable. However, when the two arguments come together, they are not easily reconciled. But many phenomena relating to Airbnb, crime and the housing market have been discussed separately without any proper reconciliation. The problem and the moderating effect can be illustrated in Figure 1, which indicates that the security risk due to Airbnb may not be directly reflected in the association between Airbnb density and house prices but may act as a moderator of the effect of crime rates on house prices. The moderation can be interpreted as trespassing-related crime effects on house prices, because the presence of Airbnb is found to be positively associated with property-related crimes (Ke et al., 2021). More importantly,

Airbnb occupants not only cause an immediate direct increase in crime rate but do so via a moderating pathway, whereby a substantial replacement of long-term owner-occupiers by short-term renters gradually erodes local anti-crime social dynamics (Xu et al., 2017).

Using Auckland City of New Zealand as a case study, this research note demonstrates the moderating effect of Airbnb-related crime on house prices. Neighbourhood qualities, such as household incomes, ethnicity concentration and the proportion of public housing in each mesh block (i.e. census-tract) neighbourhood, are controlled. Auckland City is used as a case because the city shares many similarities with global tourism cities in developed countries, such as Melbourne in Australia, New York in the United States, London in the United Kingdom and Paris in France. The problem of property crimes such as vandalism and theft is a particular concern in these cities. According to the Numbeo's (2022) Crime Index, the problem of property crime in Auckland is at 54.62, slightly higher than that in Melbourne (53.53), while similar to that in New York (54.94) and London (56.8). Even though the aggravated property-related crime in these tourist cities may not be directly attributable to the lodging industry, this pattern provides a context for using Auckland to illustrate the moderating effect hypothesis.

This research note will be structured as follows. The ensuing section outlines how we empirically identify Airbnb's moderating effect of crime on house prices. The following section presents the empirical results. Finally, the last section provides concluding remarks.

How to identify Airbnb's moderating effect of crime on house prices?

In this study, we first apply the traditional hedonic pricing model to demonstrate how the literature considers the direct effects on house prices, of neighbourhood qualities, such as crime rate, median personal income, ethnic minority density and the proportion of social housing. Airbnb density in the neighbourhood will be an additional variable of interest in the model (AirDNA, 2021). 'Neighbourhood' in this study is defined in mesh block level, similar to the census tract in the United States¹. There are 7047 mesh blocks in the 365 Census Area Units of the Auckland Region (i.e. an average of 19 mesh blocks per area unit).

Equation (1) shows the baseline hedonic pricing model in the semi-log specification (**Model 1**), including the variables of neighbourhood qualities

$$P_{ist} = \alpha_0 + \sum_{e=1}^E \varphi_e N_{met} + \sum_{k=1}^K \gamma_k X_{ik} + \sum_{t=1}^T \alpha_t D_{it} + \sum_{s=1}^S \theta_s L_{is} + \varepsilon_{ist} \dots \quad (1)$$

where P_{ist} denotes the natural logarithm of transaction price of property i at time t at suburb s ($i = 1, \dots, n$; $t = 1, \dots, T$; $s = 1, \dots, S$), φ_e estimates the price effects of the concentration of e^{th} neighbourhood quality N_{met} ($e = 1, \dots, E$) in the mesh block m where the i^{th} house or apartment is located at time t and γ_k denotes the implicit price for the k^{th} property characteristic X_{jk} ($k = 1, \dots, K$), such as number of bedrooms and bathrooms, floor area, year built, view and tenures². D_{it} denotes the time dummy, which is set to 1 if the i^{th} house sold at time t , and otherwise to 0. L_{is} denotes the suburb location dummies, which is set to 1 if the i^{th} house sold is located at suburb s , and otherwise to 0. ε_{ist} represents the error term with the mean zero and the variance σ^2 . The coefficients φ_e , γ_k , α_t and θ_s can be estimated by the ordinary least squares method.

Five neighbourhood qualities, viz (a) median personal income, (b) crime rate, (c) ethnic minority density, (d) proportion of public housing and (e) Airbnb listing density in a neighbourhood, are included as controls. Median personal income is in NZD and number of criminal cases is in natural logarithm form, whereas the ethnic minority density, proportion of public housing and Airbnb listings density variables (N_{met}) are calculated by dividing the total number of household counts or

housing units in the quality group e in the mesh block m where the transacted house is located at time t , by their corresponding totals in each mesh block.

By means of two difference-in-differences (DID) hedonic price models, we examine the moderating effect of Airbnb density on the crime rate effect on house prices. Model 2 shows the specifications of the DID hedonic pricing model, which includes an interaction term of crime rate and Airbnb density in the mesh block m at time t (Equation (2)).

$$P_{imt} = \alpha_0 + \varphi_1 \text{Airbnb}_{mt} + \varphi_2 \text{Crime}_{mt} + \beta_1 \text{Airbnb}_{mt} \times \text{Crime}_{mt} + \sum_{e=3}^E \varphi_e N_{met} + \sum_{k=1}^K \gamma_k X_{ik} + \sum_{t=1}^T \alpha_t D_{it} + \sum_{s=1}^S \theta_s L_{is} + \varepsilon_{ist...} \quad (2)$$

φ_1 and φ_2 estimate the direct effects of the Airbnb density Airbnb_{mt} and the natural logarithm of the number of crime Crime_{mt} of the mesh block m on the house prices at time t . β_1 estimates the moderating effect of Airbnb density on the effect of crime rates on house prices.

Airbnb as a moderator of crime and house prices

Table 1 reports the results for the hedonic pricing model. In the two baseline models, Airbnb density negatively affects house prices, but the effect is only significant in apartment-type housing. These results are different from those in most previous studies, probably because the crime rate variable is included. When the interaction term is added in **Model 2**, the sign of the Airbnb density effect on house prices depends on the crime rate of the neighbourhood. As illustrations, consider the coefficients of Airbnb_{mt} (0.266, 0.084) and $\text{Airbnb}_{mt} \times \text{Crime}_{mt}$ (-0.100, -0.036) of Columns 3 and 4 in Table 1. Only in mesh blocks of less than 14.3 ($e^{\left(-\frac{0.266}{-0.100}\right)}$) and 10.2 ($e^{\left(-\frac{0.084}{-0.036}\right)}$), the number of reported criminal cases per year will exhibit a positive Airbnb's density effect on apartment housing prices and single-family house prices. More importantly, the result confirms that Airbnb density imposes a negative and significant moderating effect on the impact of crime rate on house prices. The moderating effect of Airbnb density is much more negative in apartments (-0.100) than that in houses (-0.036). In other words, a greater discount in housing prices is evident in neighbourhoods of the same Airbnb density for apartments than for houses. The greater discount confirms the security concerns of short-term occupiers, especially in properties of multiple ownership. When we also estimate the DID models via quantile regression, the results remain largely intact, except in luxurious apartments, as shown in Supplemental Table A1 and Supplemental Table A2.

The empirical result supports the hypothesis of the moderating effect of Airbnb on the effect of crime rate on housing prices. It reconciles the previous conflicting findings that the presence of Airbnb is associated with higher housing prices and a higher amount of crime. It is because all the previous studies considered the two effects as independent effects and remained unaware that Airbnb density moderates the crime rate effect. The moderation is also different between apartments and houses, probably due to the multiple ownership of apartments.

Concluding remarks

While Airbnb is considered a demand driver that leads to an increase in house rents and prices in a neighbourhood, it has been argued that the presence of Airbnb is linked to more crime, which can cause a reduction in house prices. How do we reconcile these mixed hypotheses and empirical evidence in

Table 1. Regression results of hedonic pricing models.

Equation Model	(1) Baseline apartments P_{ist}	(1) Baseline houses P_{ist}	(2) DID apartments P_{ist}	(2) DID houses P_{ist}
Dep. Variables				
$Airbnb_{mt}$	-0.052 (-2.020)**	-0.014 (-0.635)	0.266 (2.707)***	0.084 (1.696)*
$Crime_{mt}$	-0.005 (-1.214)	0.001 (0.963)	-0.002 (-0.469)	0.001 (1.243)
$Airbnb_{mt} \times Crime_{mt}$	-	-	-0.100 (-3.357)***	-0.036 (-2.236)**
$Income_{mt}$	0.077 (6.173)***	0.036 (6.292)***	0.078 (6.300)***	0.036 (6.308)***
$Minority_{mt}$	-0.323 (-8.495)***	-0.314 (-26.681)***	-0.332 (-8.716)***	-0.314 (-26.681)***
$PublicHse_{mt}$	-0.212 (-0.869)	-0.056 (-0.963)	-0.233 (-0.956)	-0.051 (-0.885)
Structural F.E.	Yes			
Time F.E.	Yes (Monthly)			
Location F.E.	Yes (Suburbs)			
Observations	3,525	27,839	3,525	27,839
Adj. R-squared	0.830	0.865	0.830	0.865

Notes: *, ** and *** mean that the coefficient is significant at the 10%, 5% and 1% levels, respectively. Figures in parentheses are *t*-statistics. Columns 1 and 2 (Model 1) are the baseline model for transactions of apartments and houses, respectively. Columns 3 and 4 (Model 2) are the corresponding DID models, including an interaction term of Airbnb density and crime rate (i.e. $Airbnb_{mt} \times Crime_{mt}$). All models control structural attributes of the property transacted, time factors, location factors and another three neighbourhood qualities, viz. median personal income, the proportion of ethnic minorities and proportion of public housing at the mesh block level.

the literature? The paradox motivates this research. In this research note, we hypothesise that the higher penetration of Airbnb properties in an area not only has a direct effect on house rents but also moderates the effect of crime rates on house prices. The popularity of Airbnb in a community replaces long-term owner-occupiers with short-term occupants, which erodes the anti-crime capability of the community. Apartment-type housing estates are particularly vulnerable due to multiple ownership of common spaces and amenities. Traditionally, many housing estates are converted into gated communities to protect against trespassers. However, with the growth of peer-to-peer online accommodation services, such as Airbnb, the gated community can no longer provide such security. The differences in the effects of Airbnb on the prices of single-family houses and multiple-ownership apartment units shed light on the security concerns of homeowners.

This study makes use of Auckland data and confirms a negative and significant moderating effect of Airbnb density on the effect of crime rates on house prices in apartment-type housing and single-family houses. The moderating effect of Airbnb density is much more damaging in apartments than that in houses. In other words, the discount in housing prices due to Airbnb density is larger in magnitude for apartments than for single-family houses. A further study on the three relationships, that is, crime rate, house prices and Airbnb density, with the same set of data is being conducted. As short-term accommodations in residential neighbourhoods can have both positive and negative impacts on house prices, the results may have important policy implications in regulating Airbnb.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Faculty Research Development Fund (3722103, 3725247).

ORCID iDs

Ka Shing Cheung  <https://orcid.org/0000-0001-7377-3184>

Chung Yim Yiu  <https://orcid.org/0000-0003-2446-8276>

Supplemental Material

Supplemental material for this article is available online.

Notes

1. ‘A mesh block is the smallest geographic unit for which statistical data is collected and processed by Stats NZ. Each mesh block borders on another to form a network covering all of New Zealand. Mesh blocks are added together to build up larger geographic areas such as statistical area 1 (SA1)’. (StatsNZ, 2018)
2. The following outliers are excluded: house price \leq \$0; floor area \leq 10sm; floor area \geq 4000sm; no. of bathrooms \geq 7; no. of bedrooms \geq 7; non-house and non-apartment type housing; non-freehold tenures. The attributes of number of bedrooms, bathrooms and floor area are continuous variables, whereas the attributes of year built (cohorts in decade) are dummy variables.

References

- AirDNA (2021) *Auckland City, Airbnb Data*. Denver: AirDNA, LLC. <https://www.airdna.co/vacation-rental-data>.
- Barron K, Kung E and Proserpio D (2021) The Effect of Home-Sharing on House Prices and Rents: Evidence from Airbnb. *Marketing Science* 40(1): 1–191. DOI: [10.1287/mksc.2020.1227](https://doi.org/10.1287/mksc.2020.1227).
- Biagi B and Detotto C (2014) Crime as tourism externality. *Regional Studies* 48(4): 693–709.
- Brunt P, Mawby R and Hambly Z (2000) Tourist victimisation and the fear of crime on holiday. *Tourism Management* 21(4): 417–424.
- De Albuquerque K and McElroy J (1999) Tourism and crime in the Caribbean. *Annals of Tourism Research* 26(4): 968–984.
- Dimanche F and Lepetic A (1999) New orleans tourism and crime: a case study. *Journal of Travel Research* 38(1): 19–23.
- Garcia-López M À, Jofre-Monseny J, Martínez-Mazza R, et al. (2020) Do short-term rental platforms affect housing markets? Evidence from Airbnb in Barcelona. *Journal of Urban Economics* 119: 103278.
- Horn K and Merante M (2017) Is home-sharing driving up rents? Evidence from Airbnb in Boston. *Journal of Housing Economics* 38: 14–24.
- Ke L, O’Brien D and Heydari B (2021) Airbnb and neighbourhood crime: the incursion of tourists or the erosion of local social dynamics? *Plos One* 16(12): e0261886. DOI: [10.1371/journal.pone.0253315](https://doi.org/10.1371/journal.pone.0253315).
- Leick B, Kivedal BK, Eklund MA, et al. (2021) Exploring the relationship between Airbnb and traditional accommodation for regional variations of tourism markets. *Tourism Economics*. DOI: [10.1177/1354816621990173](https://doi.org/10.1177/1354816621990173).
- Mehmood S, Ahmad Z and Khan AA (2016) Dynamic Relationships between Tourist Arrivals, Immigrants, and Crimes in the United States. *Tourism Management* 54: 383–392.

- Numbeo (2022) Crime indices of cities, Numbeo. Available at: <https://www.numbeo.com/crime/> (accessed 31 March 2022).
- Sheppard S and Udell A (2016) Do Airbnb properties affect house prices? *Williams College Department of Economics Working Papers* 3(1): 43. Available at: <https://econpapers.repec.org/paper/wilwileco/2016-03.htm> (accessed 28 March 2022).
- Stats NZ (2018) *Auckland Region, 2018 Census place summaries*. New Zealand Government. Available at: <https://www.stats.govt.nz/tools/2018-census-place-summaries/auckland-region> (accessed 27 January 2022).
- Todd J, Musah A and Cheshire J (2022) Assessing the impacts of Airbnb listings on London house prices. *Environment and Planning B: Urban Analytics and City Science* 49(1): 206–222. DOI: [10.1177/23998083211001836](https://doi.org/10.1177/23998083211001836).
- Xu Y-H, Kim J-w and Pennington-Gray L (2017) Explore the spatial relationship between Airbnb rental and crime, travel and tourism research association: advancing tourism research globally. Available at: https://scholarworks.umass.edu/ttra/2017/Grad_Student_Workshop/5.5.
- Yiu CY and Cheung KS, (2021) Urban zoning for sustainable tourism: A continuum of accommodation to enhance city resilience. *Sustainability* 13(13): 7317.

Author biographies

Dr William K.S. Cheung is a Senior Lecturer in Property at the University of Auckland. His research primarily focuses on property markets, including understanding the roles governments and institutions can play in shaping sustainable housing markets. To complete his research agenda and to understand the role of urban real estate market dynamics in the context of the broader economy, he has adopted a unique transdisciplinary approach. William was an Endeavour research fellow at the University of Melbourne and a Fulbright Scholar at the University of California, Los Angeles (UCLA).

Dr Edward Chung Yim Yiu is an Associate Professor in the Department of Property at the University of Auckland. He is currently one of the Faculty Research Committee members. He has written and researched widely on housing policy and housing price analysis. He has also linked his research to practice; he was the elected candidate representing the Architectural, Surveying, Planning and Landscape Functional Constituency in the Legislative Council of Hong Kong in 2016, and a Fellow of the Royal Institution of Chartered Surveyors.