WHAT AIRBNB DOES TO THE HOUSING MARKET

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ABSTRACT

Based on a microeconometic model, this paper examines the effect of Airbnb in rents and house prices. Using borough-level data from the city of London between 2016 and 2019, we estimate System GMM regression models that indicate that Airbnb presence has an upward effect on the prices of both house purchases and of rentals, even disaggregating by categories; but the effect is stronger on house prices than rents, as theorized by the model. This evidence confirms that Airbnb affects the housing market by increasing the value of real estate properties.

KEYWORDS: rental markets; house prices; Airbnb; home-sharing

HIGHLIGHTS

- Our model predicts that house prices rise more than rents with Airbnb presence
- Airbnb presence in a borough increase house prices and, to a lesser extent, rents
- Results suggest that tourist renting may offset increased housing costs for owners

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WHAT AIRBNB DOES TO THE HOUSING MARKET

The proliferation of Internet-supported peer-to-peer platforms such as Airbnb has raised the interest of researchers due to their impact on the traditional markets (Einav, Farronato, & Levin, 2016). On the demand side, a clear segmentation can be assumed insofar as tourists are different from residents—the former demand short-term accommodation, the latter want long-term rentals or mortgages. As for supply, the profitability of short-term rentals (intended to meet tourists' demand) is higher than that of long-term rentals (for residents), which would cause property owners to redirect their supply towards the tourist market, ultimately raising rental prices and sometimes displacing residents from city centers to peripheries.

There are working papers that try to evaluate the impact of the growth of Airbnb on the housing market in different cities using econometric techniques. For example, Coyle and Yeung (2016) estimate that the arrival of Airbnb might be positively correlated with an index of housing rentals in London, but not in Berlin, and a joint analysis of both cities results in an insignificant correlation. In a similar vein, Segú (2018) concludes that Airbnb is responsible for a 4% increase in rents in Barcelona. Amongst the rare empirical research on the topic, Horn and Merante (2017) estimates that Airbnb's activity has caused a reduction in the supply of housing available for potential residents in Boston, and an increase in rents. They assert that if the growth detected in Airbnb supply up to 2015 were to be maintained, the average monthly rent in Boston in 2019 would be $178 higher than that without Airbnb.

This study investigates the impact of Airbnb on housing and rental prices. The model proposed is based on Barron, Kung, and Proserpio (2018)'s for segmented housing markets (short- and long-term lets). The central tenet is that a home cannot be alternatively rented in one another market, because of the lease length (whether it is above or below six months) and the corresponding tenant's rights. Each landlord, assumed absent from their home, owns 1 unit of housing and allocates it to either market, taking prices as given. There is a total of $H=S+L$ units of housing—hence, of hosts. The rental rate for short-term leases is Q, which is exogenous—because these homes are used by tourists, and thus compete internationally. The unit profit for hosts renting short-term is $Q-c-\varepsilon$, where c is a cost that originates from the lack of development in this sector and is equal for everyone; and $\varepsilon \in (-\infty, +\infty)$. is an unobservable individual-level taste parameter following a cumulative density function f.

Supposing long-term housing is traded at rate R, every host for which $Q-c-\varepsilon>R$ will join the short-term housing market, and the share of short-term owners will be $f(Q-R-c)$. The rental rate (and profit) from long-term renting is

$$R = r([1 - f(Q - R - c)]H), \qquad (1)$$

which is a function r of $[1-f(Q-R-c)]H$ with $r'<0$, since equilibrium price decreases with supply.

The purchase price of housing is its total value in the future, considering its two possible uses—short- and long-term renting,

$$P = \Sigma_{t=0}^{\infty} \delta^t \mathbb{E}[R + \max\{0, Q - R - c - \varepsilon] \quad (2)$$

where $\delta \in (0, 1)$ is a discount factor. Rewriting (2) as:

$$P = \frac{1}{1-\delta}[R + \mathbb{E}[Q - R - c - \varepsilon | \varepsilon < Q - R - c] \cdot \mathrm{f}(Q - R - c)], \quad (3)$$

we define

$$g \equiv \mathbb{E}[Q - R - c - \varepsilon | \varepsilon < Q - R - c] \cdot f(Q - R - c)] \quad (4)$$

which grows in $Q-R-c$. Now, we want to obtain $\frac{\partial R}{\partial c}$ and $\frac{\partial P}{\partial c}$ to value the effect of the emergence of a home-sharing platform (i.e. a reduction in c). Let us recall $R = R(L)$ where $L = H(1 - f(y))$, and define $y \equiv Q - R - c$. Writing $H(1 - f(y))$ as $(H - Hf(y))$, we have that:

$$\frac{\partial R}{\partial c} = \frac{\partial r(H - Hf(y))}{\partial c} = r' \frac{\partial}{\partial c}(H - Hf(y)) = -r' H f'(y) \frac{\partial y}{\partial c} \quad (5)$$

because Q does not depend on c. Then,

$$\frac{\partial y}{\partial c} = \frac{\partial}{\partial c}(Q - R - c) = -\frac{\partial R}{\partial c} - 1 \quad (6)$$

Replacing (6) in equation (5),

$$\frac{\partial R}{\partial c} = -r' H f'(y) \left(-\frac{\partial R}{\partial c} - 1\right) \quad (7)$$

developing the sum,

$$\frac{\partial R}{\partial c} = r' H f'(y) \frac{\partial R}{\partial c} + r' H f'(y) \quad (8)$$

subtracting $r' H f'(y)$ from both sides,

$$\frac{\partial R}{\partial c}\left(1 - r'Hf'(y)\right) = r'Hf'(y) \tag{9}$$

dividing both sides by $1 - r'Hf'(y)$

$$\frac{\partial R}{\partial c} = \frac{r'Hf'(y)}{1 - r'Hf'(y)} \in (-1, 0) \tag{10}$$

that is, long term rental rates increase as the short-term rental market operation costs decreases. As for the housing price, it can be written as

$$P = \frac{1}{1 - \delta}\left(R + g(y)\right) \tag{11}$$

Then, differentiating *P* with respect to *c*,

$$\frac{\partial P}{\partial c} = \frac{1}{1 - \delta}\left(\frac{\partial R}{\partial c} + \frac{\partial g}{\partial y}\frac{\partial y}{\partial c}\right) \tag{12}$$

Writing $\frac{\partial g}{\partial c} \equiv g'$, and since *Q* does not depend on *c* and $\frac{\partial c}{\partial c} = 1$,

$$\frac{\partial P}{\partial c} = \frac{1}{1 - \delta}\left(\frac{\partial R}{\partial c} + g'\left(-\frac{\partial R}{\partial c} - 1\right)\right) \tag{13}$$

Reorganizing,

$$\frac{\partial P}{\partial c} = \frac{1}{1 - \delta}\left[\frac{\partial R}{\partial c} - \left(1 + \frac{\partial R}{\partial c}\right)g'\right] \tag{14}$$

is even more negative than (10). Therefore, house prices should increase more with the arrival of the peer-to-peer accommodation market associated to a fall in *c* than short-term lets.

Our Airbnb data on the number of listings per borough comes from AirDNA, a website providing information on 10 million vacation rentals across 80,000 cities of active listings in different temporal moments since 2016Q3. The average monthly private rents, recorded by City Hall's London Datastore per 12 month rolling period, were also obtained at the borough level. We considered the interval overlapping with AirDNA data; hence, $t_{rent} = 2016Q1, 2016Q3, 2017Q1 \ldots 2019Q1$ ($T_{rent} = 10$). There are six groups of rents: *room*, *studio*, *one-*, *two-*, *three-*, *four- or more bedroom*, and *all categories*. The annual mean of property prices, by the GLA from Price Paid Data, comes from the Land Registry website and is available for the years ending in every quarter from June 2009 to December 2017 (Land Registry, 2020). Here, $t_{house} = 2015Q4, 2016Q1, 2016Q2, 2016Q3 \dots Q42017$ ($T_{house} = 6$). Because house prices are a total, while rents are monthly payments, both will be logarithm-transformed so that their associated coefficients can be compared in relative terms. The empirical models are of the form,

$$\log Y_{b,t} = \beta_0^Y + \beta_1^Y Airbnb_{b,t} + \beta_2^Y \log Y_{b,t-1} + \Sigma_{i=1}^{T-1} B_t^Y D_t + u_{b,t}^Y \quad (15)$$

where Y_{tb} is either rents (of one of the six categories) or house prices, in period *t* and borough *b*; β_0^Y is the corresponding regression intercept; $Airbnb_{b,t}$ is the number of listings in borough *b* and period *t* (and hence, β_1^Y are the coefficients of interest); $\log Y_{b,t-1}$ is a lagged term of the dependent variable; D_t are time dummies for each periods except the base (and hence B_t^Y are time effects); and $u_{b,t}^Y$ is a borough- and time-dependent error term.

The estimation technique we use is the System GMM devised by Arellano and Bover (1995) and enhanced by Blundell and Bond (1998). This fits our dynamic data panels with small *T* and large *N*, and accounts for possible fixed effect and idiosyncratic heteroskedastic errors correlated within individual observations. Time effects and a lagged term of the dependent variable (to control for price stickiness) have been used as instruments. Furthermore, we verify with data from the same source whether Airbnb presence and income (average income of tax payers) or education (highest level of qualification held) indicators seemed not statistically significantly related; hence the orthogonality condition needed (that changes in the instrumenting variables are uncorrelated with the fixed effects) is likely to be satisfied.

We estimate (15) for seven dependent variables (six for each category of rents and one for house prices as dependent variables) and their results are presented in Table 1.

Table 1. System GMM regression on log-private gross monthly rent paid and on log-property prices.

	Rent							House price
	Room	Studio	1-bedroom	2-bedroom	3-bedroom	4+bedrooms	All types	
Airbnb	.0000795***	.0001268***	.0001232***	.0001423	.000149***	.0002085***	.0001402***	.0003172***
	(.000012)	(.0000471)	(.0000287)	(.0000355)	(.0000254)	(.0000355)	(.0000267)	(.0000713)
Intercept	6.252034***	6.550608***	6.822522***	7.021164	7.217717***	7.424186***	7.026427***	12.69178***
	(.0213961)	(.0772391)	(.043178)	(.0524288)	(.0448286)	(.0707366)	(.0421132)	(.1044766)
N	187	198	198	198	191	192	198	264
Wald χ^2	43.81	7.23	43.81	16.09	34.31	34.60	27.62	19.81
Prob.>χ^2	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. * $p<0.05$, ** $p<0.01$, *** $p<0.001$

As shown, all coefficients are positive and statistically significant; but the increase for a given number of Airbnb listings has been stronger for house prices than for rents, in any category. In particular, 100 new Airbnb listings in the borough provoke a decrease of 0.008%, 0.013%, 0.012%, 0.014%, 0.015% and 0.021% in the average monthly rents of rooms, studios, one-, two-, three-, and four or more-bedroom homes, and all categories, respectively. This is aligned with the intuitive logic that indeed, reduced supply of homes with more alternatives to traditional rentals raise their prices also supported in the model with a negative derivative of rents to the costs of a peer-to-peer platform. However, the last column shows that for each 100 Airbnb listings in a borough, the house price paid is 0.031% more expensive, which is a larger coefficient than any of those associated to rents from different categories.

The results suggest that the presence of Airbnb in London increases house prices and, with less generality and significance, affects long-term rents, in line with the predictions of the theory. The effect on house prices is stronger, because more homeowners are turning to supplying their home in the tourist market (making the supply for residence scarcer and more expensive), and because the fact that more Airbnb listings in one area hints to the profitability of those there, raising the value of a house—which can be rented to tourists, partly or entirely. Most of the time, the resident of a rented home cannot sublet their home to tourists via Airbnb, so they only experience the increase in rents via landlords reducing their supply in favor of tourist accommodation.

This evidence contributes to understanding the impact of Airbnb on city residents. Although renting contracts are rather seen as substitutes (from the perspective of landlords) to tourist accommodation supply, the effect on the former might appear negligible. This does not mean that effects on the cost of living of residents are absent. In fact, they take place via house prices and thus mortgages. Thus, the positive effects of Airbnb—complementing rents of inhabitants—might be offset by the increase in housing costs. However, if the landlord decides to offer their idle property in the short-term holiday market, this increase in costs will be compensated.

This does not imply that public regulation to control the growth of rentals is unnecessary. Besides the economic real estate effects, Airbnb-like platforms and, more generally, mass tourism, have social and environmental costs. Here, the severity of the problem might vary from borough to borough. If the effect is especially stark on rents—which are not only a more precarious form of property for residents, but also a contract where the benefits of Airbnb cannot be perceived—limiting the number of tourist accommodation and incentivizing long-term rentals in the local market could be desirable.

This work is novel in that it shows a positive effect in house prices (and rents), which is often claimed in the public debate but had not been yet demonstrated by the literature. More research is required to verify whether this is true in other cities. It also suggests a possible beneficial effect of Airbnb to homeowners via an increase in the value of their property thanks to this new profitable option, so more research on which socioeconomic or demographic group really perceives this benefit would be useful to determine whether this industry decreases inequality via social inclusion, or just directs more wealth to real estate investment in the expense of the remaining population.

References

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, *68*(1), 29−51.

Barron, K., Kung, E., & Proserpio, D. (2018). The Sharing Economy and Housing Affordability: Evidence from Airbnb. Retrieved from https://ssrn.com/abstract=3006832 (2018), Accessed 16th April 2020

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, *87*(1), 115−143.

Coyle, D., & Yeung, T. (2016). Understanding AirBnB in Fourteen European Cities, Working Papers, The Jean Jacque Laffont Digital Chair. Retrieved from https://www.businesstravel.fr/images/pdf/etude-airbnb2016coyle.pdf (2016), Accessed 16th April 2020

Einav, L., Farronato, C., & Levin, J. (2016). Peer-to-peer markets. *Annual Review of Economics*, *8*, 615−635.

Horn, K., & Merante, M. (2017). Is home sharing driving up rents? Evidence from Airbnb in Boston. *Journal of Housing Economics*, *38*, 14−24.

Land Registry (2020). Average House Prices by Borough, Ward, MSOA & LSOA [data file]. Retrieved from https://data.london.gov.uk/dataset/average-house-prices (2020), Accessed 16th April 2020

Segú, M. (2018). Do short-term rent platforms affect rents? Evidence from Airbnb in Barcelona, MPRA Paper No. 84369. Retrieved from https://ideas.repec.org/p/pra/mprapa/84369.html (2018), Accessed 16th April 2020