A Look Inside Airbnb

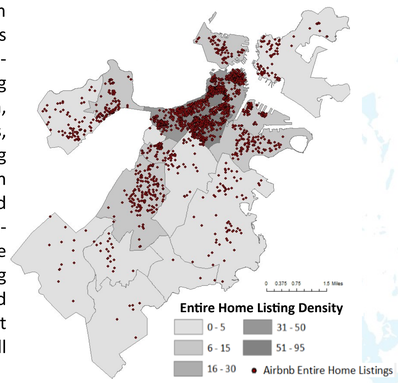
How the Country's Largest Home Sharing Network is Threatening Housing Affordability in Boston

Introduction

Airbnb, a peer-to-peer online market and homestay network, allows homeowners to list bedrooms, apartments or their homes for short-term lodging. Founded in 2008, the company has been wildly successful, spreading to every major city in the U.S and the world.[1]

An icon and pioneer in the sharing economy, Airbnb markets to home-owners as a way to earn extra income. Recent studies show however, that that is not the entire picture, as Airbnb listings are often apartments or homes removed from the long-term rental market. By decreasing the long-term housing stock, Airbnb has the ability to increase housing prices and harm housing affordability. In reaction, many cities like Los Angeles, have passed laws limiting the number of days an Airbnb listing can be rented for. San Francisco has limited owners to only one listing, and others including New York City, have found ways to ultimately limit Airbnb short-term rentals all together.[2]

Figure 1. Airbnb Entire Home Listing Density

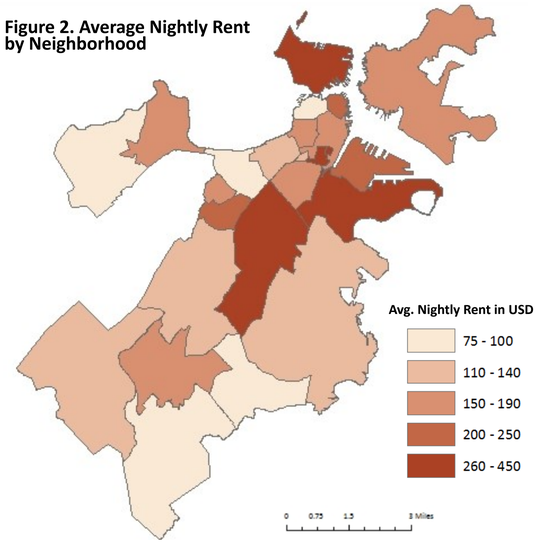


In reaction to these recent regulations, this project seeks to assess Airbnb's apartment/home rental market in Boston. This will be achieved through an analysis of the following three questions. How many listings are managed by owners with multiple listings? How many days would it take for an apartment to make more money listing on Airbnb than on the long-term market? How do demographic, neighborhood, and home characteristics influence Airbnb listing prices? The final question will develop a predictive model, helping to inform how Airbnb prices might change due to shifting neighborhood characteristics.

Methods

To answer the first two questions, Airbnb listings[3] gathered by Tom Slee from *Inside Airbnb,* were geocoded and then limited to entire home and apartment listings. Shared apartments/bedroom listings were excluded, as they do not threaten the long-term market in the same way. Airbnb data, including average Airbnb listing prices, owner information and housing characteristics were aggregated at the neighborhood level.

Figure 2. Average Nightly Rent by Neighborhood



These results generated average prices by neighborhood as shown in Fig. 2, and along with excel analysis, percent of owners with multiple listings by neighborhood shown in Fig. 3.

To find the number of days it would take for an apartment to make more money listing on Airbnb than on the long-term market, data on average long-term apartment rentals was needed. This was found through the *American Community Survey (2011-2015),* and was aggregated from census tracts to the neighborhood level. Fig. 4 and Table 2 illustrate the findings by neighborhood.

To create a predictive model to inform how Airbnb prices might change due to shifting neighborhood characteristics, an OLS Regression controlling for Spatial Error was used. Airbnb price per listing was the dependent variable, and using hedonic home pricing methods as a model, independent variables included neighborhood characteristics: Median Household Income, % Foreign Born, % Non-family Households, Accessibility: Distance from Downtown and Distance to Nearest Subway Station, and, Structural Housing Characteristics: Year House/Apartment was Built and Number of Bedrooms.

Discussion and Results

Looking at percent of multi-listing owners, the results show that the neighborhoods of Beacon Hill, the Back Bay, Downtown, and the South End have 51% to 85% percent of their listings by hosts listing multiple homes. Those numbers are surprisingly high, with the whole of Boston having 26% of listings by hosts with multiple homes. These findings suggest a hidden trend of real estate firms or individuals making Airbnb a commercial operation.

The results indicating the number of nights needed to earn more renting on Airbnb than renting to long-term tenants is also compelling. Listings in three neighborhoods, Charlestown, South Boston and Roxbury would make the same amount of money renting on Airbnb for 60 days or less than on the long-term market. Nine other neighborhoods are more cost effective renting for anywhere between 61 and 90 days.

The OLS regression predicting variable influence on listing price (results in Table 1), found the variables used predicted 19% of the nightly price. Four variables, number of bedrooms, age of housing structure, distance from Park Street subway station, and % of foreign born individuals were found to be significant at the 0.01 level. Two of those predictors, number of bedrooms and distance from Park Street station had coefficients that were notable, with price decreasing by $24.90 (sd. error $3.03) for every mile farther away from Park Street station, and an increase of $69.34 (sd. Error $3.53) for every additional bedroom.

Figure 3. Percent of Listings by Hosts With Multiple Listings by Neighborhood

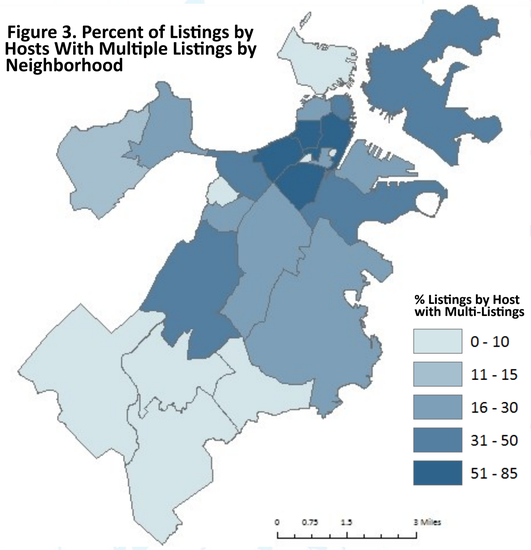
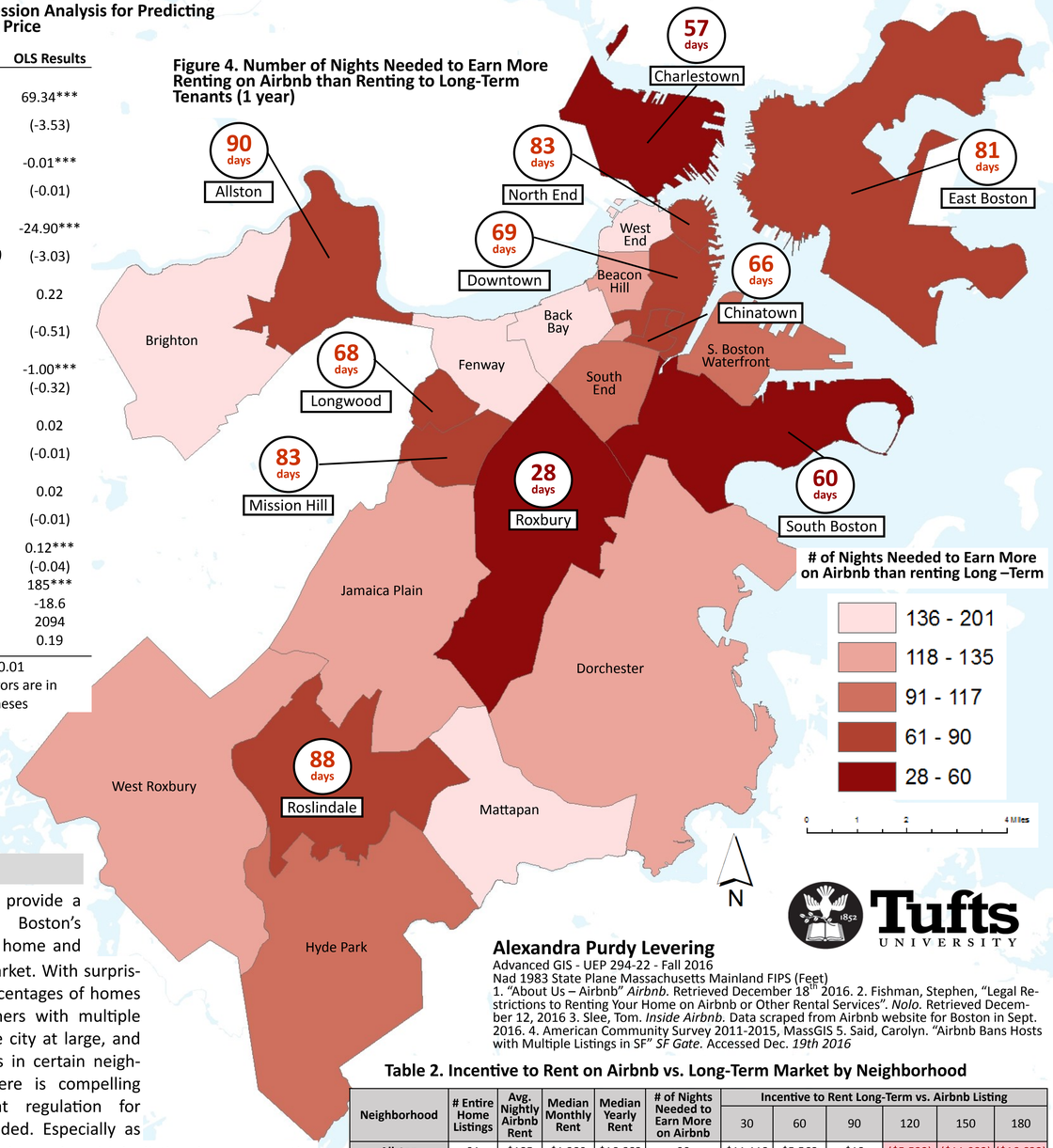


Table 1. Regression Analysis for Predicting Airbnb Listing Price

VARIABLES	OLS Results
Number of Bedrooms	69.34***
	(-3.53)
Age of Housing Structure	-0.01***
	(-0.01)
Dist. from Park St. Station *Miles (Euclidean)*	-24.90***
	(-3.03)
Dist. to Nearest Subway Station *Miles via Network Analysis*	0.22
	(-0.51)
% Foreign Born	-1.00***
	(-0.32)
% Non-Family Household	0.02
	(-0.01)
Med. Household Income (USD)	0.02
	(-0.01)
Lambda	0.12***
	(-0.04)
Constant	185***
	-18.6
Observations	2094
R-squared	0.19

*** p<0.01
Standard errors are in parentheses

Figure 4. Number of Nights Needed to Earn More Renting on Airbnb than Renting to Long-Term Tenants (1 year)



Conclusion

These results provide a look inside Boston's Airbnb entire home and apartment market. With surprisingly high percentages of homes listed by owners with multiple listings in the city at large, and extreme cases in certain neighborhoods, there is compelling evidence that regulation for Airbnb is needed. Especially as San Francisco banned multiple listing hosts once the city discovered 20% of their Airbnb listings were from multi-listing owners.[5]

Regulating listings to be rented a minimum number of days also seems pertinent, as the majority of listings by neighborhood are able to make more money renting for far less than half the year than to year-long leased tenants. Considering Los Angeles's regulation precedence, where the city limited Airbnb listings to a maximum of 60 days, Boston might be advised to follow.

Conclusively, Airbnb seems to be more than a peer-to-peer network that helps homeowners earn extra income. These results show Airbnb is being used as commercial operations, and harms housing affordability by converting long-term market listings to short-term. Policy makers should use these findings to inform policy decisions and regulate Airbnb in Boston.

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1. "About Us – Airbnb" *Airbnb.* Retrieved December 18th 2016. 2. Fishman, Stephen, "Legal Restrictions to Renting Your Home on Airbnb or Other Rental Services". *Nolo.* Retrieved December 12, 2016 3. Slee, Tom. *Inside Airbnb.* Data scraped from Airbnb website for Boston in Sept. 2016. 4. American Community Survey 2011-2015, MassGIS 5. Said, Carolyn. "Airbnb Bans Hosts with Multiple Listings in SF" *SF Gate.* Accessed Dec. *19th 2016*

Table 2. Incentive to Rent on Airbnb vs. Long-Term Market by Neighborhood

Neighborhood	# Entire Home Listings	Avg. Nightly Airbnb Rent	Median Monthly Rent	Median Yearly Rent	# of Nights Needed to Earn More on Airbnb	Incentive to Rent Long-Term vs. Airbnb Listing					
						30	60	90	120	150	180
Allston	91	$185	$1,389	$16,668	90	$11,118	$5,568	$18	($5,532)	($11,082)	($16,632)
Back Bay	262	$110	$1,707	$20,484	186	$17,184	$13,884	$10,584	$7,284	$3,984	$684
Bay Village	20	$139	$1,565	$18,780	135	$14,610	$10,440	$6,270	$2,100	($2,070)	($6,240)
Beacon Hill	155	$150	$1,641	$19,692	131	$15,192	$10,692	$6,192	$1,692	($2,808)	($7,308)
Brighton	75	$90	$1,504	$18,048	201	$15,348	$12,648	$9,948	$7,248	$4,548	$1,848
Charlestown	64	$349	$1,658	$19,896	57	$9,426	($1,044)	($11,514)	($21,984)	($32,454)	($42,924)
Chinatown	63	$287	$1,576	$18,912	66	$10,302	$1,692	($6,918)	($15,528)	($24,138)	($32,748)
Dorchester	66	$120	$1,228	$14,736	123	$11,136	$7,536	$3,936	$336	($3,264)	($6,864)
Downtown	117	$160	$922	$11,064	69	$6,264	$1,464	($3,336)	($8,136)	($12,936)	($17,736)
East Boston	70	$150	$1,016	$12,192	81	$7,692	$3,192	($1,308)	($5,808)	($10,308)	($14,808)
Fenway	208	$100	$1,539	$18,468	185	$15,468	$12,468	$9,468	$6,468	$3,468	$468
Hyde Park	6	$85	$738	$8,856	104	$6,306	$3,756	$1,206	($1,344)	($3,894)	($6,444)
Jamaica Plain	157	$130	$1,413	$16,956	130	$13,056	$9,156	$5,256	$1,356	($2,544)	($6,444)
Leather District	3	$295	$2,001	$24,012	81	$15,162	$6,312	($2,538)	($11,388)	($20,238)	($29,088)
Longwood Med.	2	$149	$845	$10,140	68	$5,670	$1,200	($3,270)	($7,740)	($12,210)	($16,680)
Mattapan	3	$75	$1,113	$13,356	178	$11,106	$8,856	$6,606	$4,356	$2,106	($144)
Mission Hill	48	$200	$1,383	$16,596	83	$10,596	$4,596	($1,404)	($7,404)	($13,404)	($19,404)
North End	119	$250	$1,722	$20,664	83	$13,164	$5,664	($1,836)	($9,336)	($16,836)	($24,336)
Roslindale	19	$175	$1,278	$15,336	88	$10,086	$4,836	($414)	($5,664)	($10,914)	($16,164)
Roxbury	58	$450	$1,059	$12,708	28	($792)	($14,292)	($27,792)	($41,292)	($54,792)	($68,292)
South Boston	102	$300	$1,497	$17,964	60	$8,964	($36)	($9,036)	($18,036)	($27,036)	($36,036)
S. Bos Waterfront	70	$200	$1,943	$23,316	117	$17,316	$11,316	$5,316	($684)	($6,684)	($12,684)
South End	251	$166	$1,457	$17,484	105	$12,504	$7,524	$2,544	($2,436)	($7,416)	($12,396)
West End	68	$99	$1,553	$18,636	188	$15,666	$12,696	$9,726	$6,756	$3,786	$816
West Roxbury	15	$120	$1,332	$15,984	133	$12,384	$8,784	$5,184	$1,584	($2,016)	($5,616)