UNIVERSITY OF CALIFORNIA

Los Angeles

Mapping AirBnB in Los Angeles

A thesis submitted in partial satisfaction

of the requirements for the degree

Master of Applied Statistics

by

Max Harris Belasco

2021

ABSTRACT OF THE THESIS

Mapping AirBnB in Los Angeles

by

Max Harris Belasco
Master in Applied Statistics
University of California, Los Angeles, 2021
Professor Frederick R. Paik Schoenberg, Chair

As housing and homelessness have become central issues in Los Angeles County, the role of AirBnB has become a frequent subject of debate. Local organizations and think tanks have cited AirBnB as exacerbating the housing crisis in the county, while the company has responded by stating it allows working families to afford their homes in an increasingly unaffordable housing market. While there have been some attempts to assess AirBnB's effect on housing markets in San Francisco and New York City, similar attempts have not been performed on Los Angeles. This article covers the use of tools applied in other city locations to assess the landscape of AirBnB listings and their potential interactions with the local housing market. Using geocoding techniques and booking calculation algorithms applied in different markets, it can be determined that the vast majority of AirBnB's revenue in the county comes from entire home rentals that appear to be hotelized. While Ellis Act applications correlate with AirBnB listings with some statistical significance, it is clear AirBnB is one among multiple factors affecting the Los Angeles housing market.

The thesis of Max Harris Belasco is approved.

Jessica Jingyi Li

Vivian Lew

Frederick R. Paik Schoenberg, Committee Chair

University of California, Los Angeles

2021

For Carley

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 Introduction

The Sharing Economy is a term given to an array of companies that specialize in providing goods and services to consumers through temporarily hiring pre-approved labor and resources. Sharing Economy companies often make their media of transaction a mobile phone application, which can either serve the purpose of being a marketplace for goods (such as meeting-space rental application PeerSpace) or as a hiring hall for on hand laborers (such as rideshare application Uber or Lyft). One of these applications is AirBnB, a rental service which allows you to rent part or all of a homeowner's residence.

AirBnB, or "Air Bed and Breakfast," started in 2008 as a homestay and vacation rental site which offers short-term lodging to its customers by offering the living room or spare bedroom of a homeowner up for rental. Like most sharing economy companies, there is an element of mutual transaction that is often dressed up as communality: The customer, an intrepid traveler or tourist wanting to travel inexpensively, can get short term lodging from a local who in turn can make some spare money through an unused room. Both sides benefit, and AirBnB takes away a small slice of the rental price for bringing both the customer and the homeowner together.

This image of communality played a key role in AirBnB's original advertisements. Drawing from the traditional image of British Bed and Breakfasts, AirBnB stressed the benefits of renting from a local rather than a hotel, hostel, or other form of official lodging. You get to know a local intimately, you learn about the sites and places only locals visit, and so on. The company also advertised itself as a more official form of Couchsurfing.com, an earlier iteration of Sharing Economy models which did not originally rely on formal transactions. However, as it became more popular for individuals to rent out the entire premises of a homeowner instead of just a room, this aspect of getting to know another individual played less and less of a role in AirBnB marketing. Advertising began to stress more the economic benefits of having AirBnB available in a given city, and while interactions with the local homeowner became less common AirBnB kept the mantra in its online ads imploring customers to "Live like a Local" (Slee, 2014, p. 34-35) [Sle17].

As AirBnB became more popular, however, it became the target of Silicon Valley skeptics and housing activists alike. Economists like Tom Slee pointed out that Sharing Economy companies like AirBnB manipulate their nebulous position as either a marketplace or service provider to skirt government regulations on housing and car safety (Slee, 2014, p.45). The Los Angeles Alliance for a New Economy (LAANE) has pointed out that monetary incentives to rent out someone's property may be so strong that it may drive homeowners to permanently take their rental properties off the market for tenant use and instead use them for short term lodging (Samaan, 2015, p. 16) [Sam15]. Like with other Sharing Economy Models, there is concern that left to operate on their own without public scrutiny these companies can cause lasting damage to the public infrastructure and available housing of popular tourist communities.

This concern has led to tenants and housing advocates connecting AirBnB's potential role in displacing tenants with California Government Code Chapter 12.75, otherwise known as the Ellis Act. Passed in 1985, the Ellis Act allows landlords to evict residential tenants despite ordinances of local municipalities that may mandate a landlord must continue to provide rental housing. While originally intended to help landlords exit the rental business and repurpose property for a different use, the Ellis Act has come under scrutiny by tenant advocates as a means to reduce rent-controlled housing units (Duran, 2015) [Dur15]. As more stories of Ellis Act evictions followed by conversion of the property to a short term rental hotels have been reported by Los Angeles news outlets (Barragan, 2015) [Bar15], policy research has been able to draw direct connections between the Ellis Act and the abuse of it to create more AirBnB rental properties, reducing the overall rental market for long term tenants (Lee, 2016)[Lee16].

This article covers some recent methods used to map and study the expansion of AirBnB in other major municipal areas such as San Francisco and New York City, and then applies them to AirBnB listings hosted in Los Angeles County. Data taken from the AirBnB website as well as from the Los Angeles Housing and Community Investment Department (HCID) is analyzed using geocoding and mapping procedures, and revenue data is calculated using an equation developed in San Francisco to better understand the landscape of income that

AirBnB generates for its hosts. Novel approaches are considered using Ellis Act and Eviction data, which are studied through regression analysis to the AirBnB listings based on zip code. Ultimately the income landscape of AirBnB listings matches trends noticed in San Francisco, with hotelized listings recognized as being the primary source of revenue, and the number Ellis Act applications showing some correlation with the number of AirBnBs in Los Angeles zip codes.

2 Methodology

2.1 Data Selection

AirBnB listing data was acquired from the website insideairbnb.com. Managed by Murray Cox, the website provides archives of data gathered through web scraping the AirBnB website. Listing data from the website includes information on listing price, number of ratings, weekly and daily rates for the listing, the size of the given listing, the listing's zip code, as well as the listing's specific coordinates in latitude and longitude. (Cox, 2017) [Cox17] This current data covers all listings scraped from the AirBnB website since August 2016. While data for later periods were available, this time was selected to be synchronous with other housing data acquired for this study.

Data for Eviction notices and Ellis Act applications was provided by the Los Angeles Housing and Community Investment Department (HCID). A public records request was made requesting all residential foreclosures occurring within the Los Angeles city limits, with foreclosures specifically citing the Ellis Act placed in an individual list. The data provided by HCID covered all foreclosures that happened from August 8th, 2013, to August 8th, 2016. A three year time span was chosen so that a proper breadth of foreclosure trends would line up with the rise in popularity of AirBnB rentals across Los Angeles. Foreclosure data included the date of the residential foreclosure application, the address of the foreclosed property, the zip code of the property, as well as the name and address of the property owner. The list of Ellis Act applications included the same data as that for the residential foreclosures.

2.2 Geocoding and Mapping

Mapping of AirBnB and foreclosure data was done using the ggmap package in RStudio. The ggmap package allows for the quick development of maps by relaying search queries to the Google Maps API, allowing for investigators to overlay data over a specified Google Map.

While the AirBnB data included specific coordinates for each listing, the Ellis Act and foreclosure data contained only the property address. This data was reconciled using geocoding functions provided by the ggmap R package, through which data can be visualized using the ggplot2 R package. (Kahle and Wickham, 2013) [KW13] Through these functions, addresses were relayed as queries to Google Maps, which then returned the specific coordinates for each listing.

Maps were created detailing the location of AirBnB rental properties based on the category of the listing - a shared room listing, a private room listing, or an entire home listing. In addition to this maps were created for Ellis Act applications across the city of Los Angeles, as well as foreclosure data.

2.3 Revenue and Hotelization Analysis

Webscrape data from AirBnB does contain booking rates for each listing, but does not contain the number of bookings annually or the total revenue brought in for each listing. To address this data gap, a utilization rate model needed to be developed to determine the relative rate at which listings were booked. One such model was devised by the San Francisco Budget and Legislative Analyst office (BLA), which uses pricing along with the number of reviews and the time the listing has been on AirBnB to determine revenue and hotelization status. (Brousseau 2015) [BMY15] That formula has been adapted for this study so that it can be used in a Los Angeles context.

To utilization rate as adapted from BLA is based on two key assumptions:

1. The average AirBnB review rate of 72 percent, as stated by Brian Chesky, CEO and

Formula (1): Estimated Number of Nights Booked

$$\frac{Number\ of\ Reviews\ for\ a\ Listing}{Average\ AirBnB\ Review\ Rate} * (Average\ Stay\ for\ a\ LA\ Short\ Term\ Rental)$$

Formula (2): Estimated Number of Days a Listing is Booked Out of the Year

$$\frac{Estimated\ Number\ of\ Nights\ Booked\ for\ a\ Listing}{Number\ of\ Days\ Listing\ is\ Active} * 365$$

Figure 1: Two formulas from the San Francisco Budget Legislative Analyst Office outlining how utilization rate and hotelization is determined for an AirBnB listing.

Co-Founder of AirBnB in 2012.

2. An average of a 4.5 night stay in short term AirBnB rentals in Los Angeles, as reported by AirBnB.

First, the total number of bookings for a given AirBnB listing is divided by the 72 percent average review rate for AirBnB users. That quotient is then multiplied by the 4.5 stay in short-term AirBnB rentals in order to get the estimated number of nights booked.

To estimate the average number of nights booked for each AirBnB listing, two additional calculations were made. First the estimated number of nights calculated in the first formula is divided by the total days a listing has been active. This produces the overall utilization rate of the AirBnB listing. That utilization rate is then multiplied with 365 days to produce an estimate for the number of days a listing was booked for each year.

This estimated number of days book could then be used to project the total revenue accumulated by a given rental, and whether or not a listing has been hotelized. Hotelization in this context means a listing that has been in use for more than 180 days in a given year, approximately half a year. These projections are studied by category and zip code, to discern if any patterns are discernible prior to proceeding into regression analysis.

2.4 Regression Analysis

To understand if there is a relationship between AirBnB listings and foreclosure data gathered from HCID, regression analysis is performed on the number of listings and foreclosures based on zip code.

In addition to a regression analysis based on zip code, an additional regression study will be performed between AirBnB listings and Ellis Act applications based on zip code as well. While foreclosures data contains instances that could be the result of many circumstances, Ellis Act applications relate to distinct attempts to withdraw long term residential property in order to rezone it. Performing regression analysis on Ellis Act applications separately from foreclosures will help in identifying if different trends persist in regards to the number of AirBnB listings.

3 Results

3.1 Summary Statistics

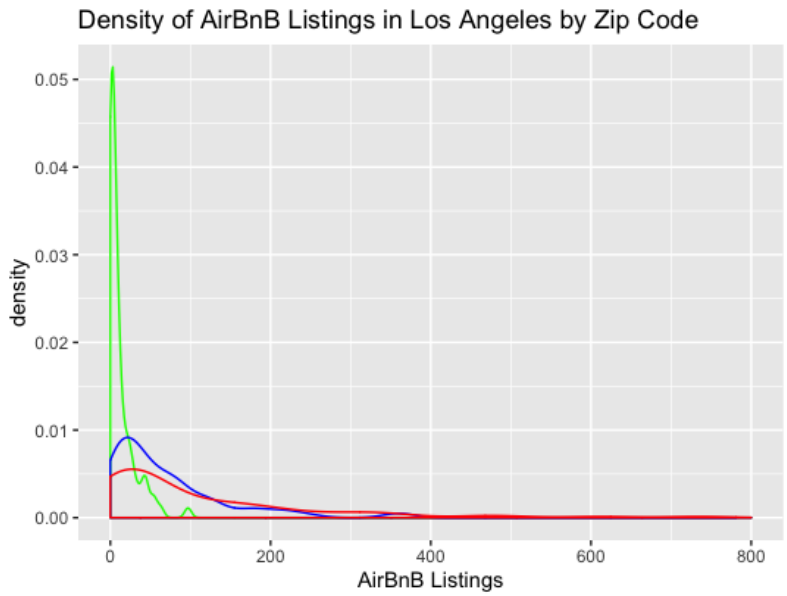

Figure 2: Density graphs depicting the respective density of AirBnB listing categories in Los Angeles - Shared Room (green), Private Room (blue), and Entire Home (red).

Data collection from insideairbnb.com produced 17743 listings located inside the city limits of Los Angeles. Each of these listings falls into one of three categories – a shared room (1015 listings), a private room (5763 listings), and an entire home (10965 listings). Density analysis as can be observed in Figure 2 based on zip codes demonstrated that the majority of listings in zip codes dense with AirBnB listings were predominantly from the entire home category. Zip codes that were less dense with AirBnB listings would be dominated by shared room and private room AirBnB listings.

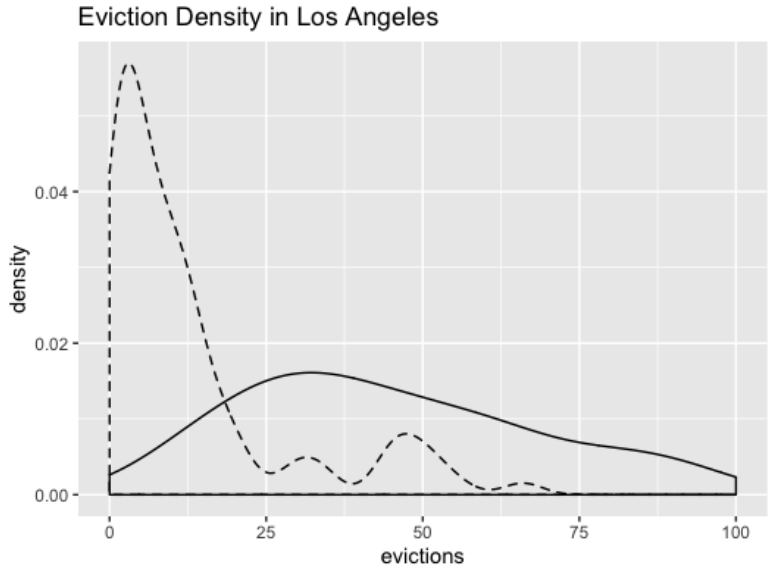

Figure 3: Eviction density graph shows Ellis Act applications (dashed) compared to other evictions.

Density analysis also shows that about 33% or a third of all AirBnB listings in Los Angeles were located in ten zip codes. These zip codes included regions of LA that were near the coast (Venice and Marina del Rey), near famous city attractions (Sunset Strip and Hollywood), or relatively near the downtown core of the city (Echo Park and Silverlake). As can be seen in Table 1, entire home listings can number as high as triple the number of private room listings in the zip codes with highest AirBnB density, with significantly fewer private rooms observed.

Data provided by the HCID included 7599 eviction cases between the years 2012 and 2015. A density plot shows that evictions fall under a single encompassing slope. This is

Zip Code	Shared Room	Private Room	Entire Home	Ellis Act	Evictions
90291 (Venice)	25	354	1236	66	30
90046 (West Hollywood)	54	366	825	45	75
90028 (Hollywood)	42	220	735	33	11
90026 (Echo Park/Silverlake)	9	249	612	48	83
90036 (La Brea)	31	224	489	29	36
90068 (Hollywood Heights)	7	187	463	10	96
90066 (Mar Vista)	44	205	346	12	50
90027 (Los Feliz)	12	126	360	13	65
90025 (West LA)	25	183	267	55	39
90292 (Marina del Rey)	19	126	314	1	14
90069 (Sunset Strip)	6	120	331	7	26

Table 1: Table of the ten zip codes with the highest AirBnB saturation, broken down by listing category, with eviction and Ellis Act application numbers.

unlike the 1067 Ellis Act applications reported by the HCID, which fall under four distinct slopes in a density plot. While a single trend appears to be occurring with evictions numbers in the city writ large, more than one trend might be affecting Ellis Act applications across Los Angeles.

These different trends identified among evictions and Ellis Act applications may be present within the same zip code. Among the ten zip codes with the highest AirBnB density, only two zip codes (Marina del Rey and Sunset Strip) are lower than the median number of Ellis Act applications per zip code, 7.5. This stands in contrast with the trend in evictions, where only three zip codes have a higher number of filed evictions than the city median of 51.5. While evictions do not appear to be abnormally higher in AirBnB-dense zip codes, the presence of Ellis Act applications is notably dense.

Type of Data	Data Points
AirBnB Listings	
Total	17743
Shared Room	1015
Private Room	5763
Entire Home	10965

Type of Data	Data Points
Eviction Data	7599
Ellis Act Applications	1067

Table 2: Number of data points used in this study, divided by category (AirBnB listings, Eviction, Ellis Act Application)

3.2 Geocoding and Mapping

A general mapping of all AirBnB listings across the city of Los Angeles shows a general blanketing of the city in listing sites, with large concentrations in West LA, Mid-City, Downtown LA, and the entire southern half of the San Fernando Valley. Dividing the listings by their category (shared room, private room, or entire home) lead to a clearer images that lent themselves to a more nuanced understanding of the terrain for short term rentals in Los Angeles.

Shared Room listings, which are the least numerous in Los Angeles, have a distinct concentration in areas adjacent to the Pacific Coast as well as the downtown core of the city. While some listing exist in San Fernando Valley, they are concentrated in neighborhoods clustered around the "Hollywood Split" – an interchange between the 101, 134, and 170 highways. This would put those listings near city attractions such as Universal Studios.

Private room listings, which are about five times as numerous as shared room listings, appear to gather in a handful of clusters within the city. One cluster is concentrated on the Pacific Coast, another in the San Fernando Valley near the Hollywood Split, a significantly larger one comprised of Downtown LA and the neighborhood directly west of it, and another in the Northeast region of LA. It is noteworthy that of the top ten zip codes that have the highest AirBnB concentration, none lie within the San Fernando Valley.

Entire home listings in Los Angeles are twice in number than the private room listings

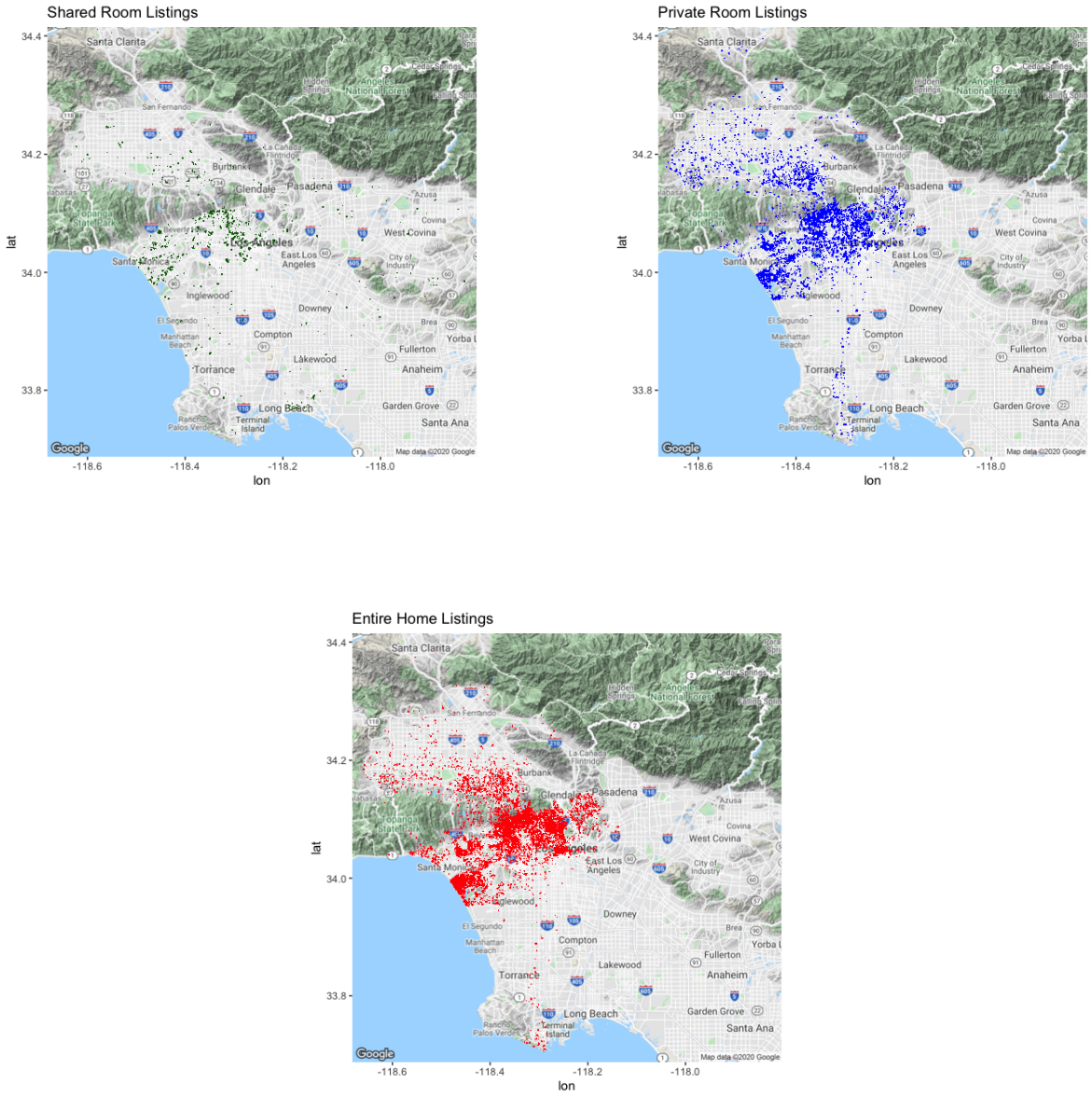

Figure 4: Los Angeles AirBnBs, mapped by listing category

and mapping them out provides a map very similar to that showing all AirBnB listings. While the four clusters identified with the private room listings appear present, they begin to fuse into each other as the density of entire home listings in each region is so high. While there may be some differences between the three categories of listings, all seem to concentrate in similar regions in areas, with differences appearing to be mostly a matter of number and concentration rather than preference of one category over another in different regions.

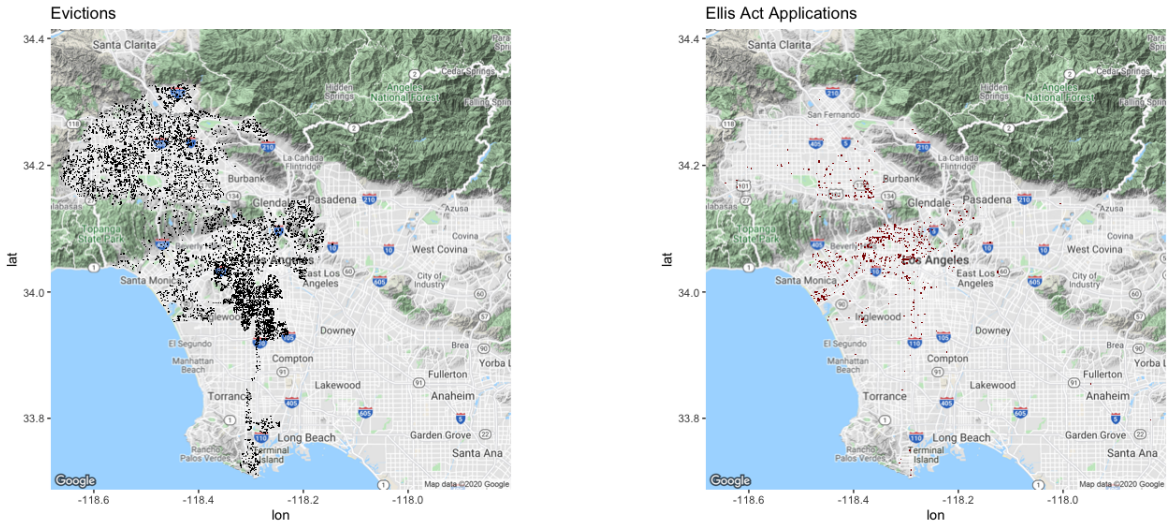

Figure 5: Los Angeles Evictions and Ellis Act Applications, Mapped

Evictions and Ellis Act applications follow their own patterns when mapped out onto the city of Los Angeles. While evictions outnumber Ellis Act applications three to one, they are concentrated in different regions than are observed with AirBnB listings. Some of the densest concentration of evictions, for example, appear in South Los Angeles as well as the northern parts of the San Fernando Valley. Ellis Act applications, however, are most concentrated in areas such as the coastal neighborhoods, the downtown core of Los Angeles as its western adjacent neighborhoods, and in the San Fernando Valley near the "Hollywood Split." These are areas that are consistent with what was originally observed with concentrations and clusters prevalent in the AirBnB listings. While evictions writ large appear to be concentrated in regions different from AirBnB listings, there is some consistency between AirBnB listings and the clusters seen with Ellis Act applications.

3.3 Revenue and Hotelization Analysis

Among AirBnB listings in the city of Los Angeles, 1582 were identified with the adopted BLA formula to be rented for at least 180 days out of the year. This would mean that 9% of AirBnBs in the city of Los Angeles could be considered "hotelized," or leased so frequently that by San Francisco's metrics the property could not feasibly be rented by a long-term tenant.

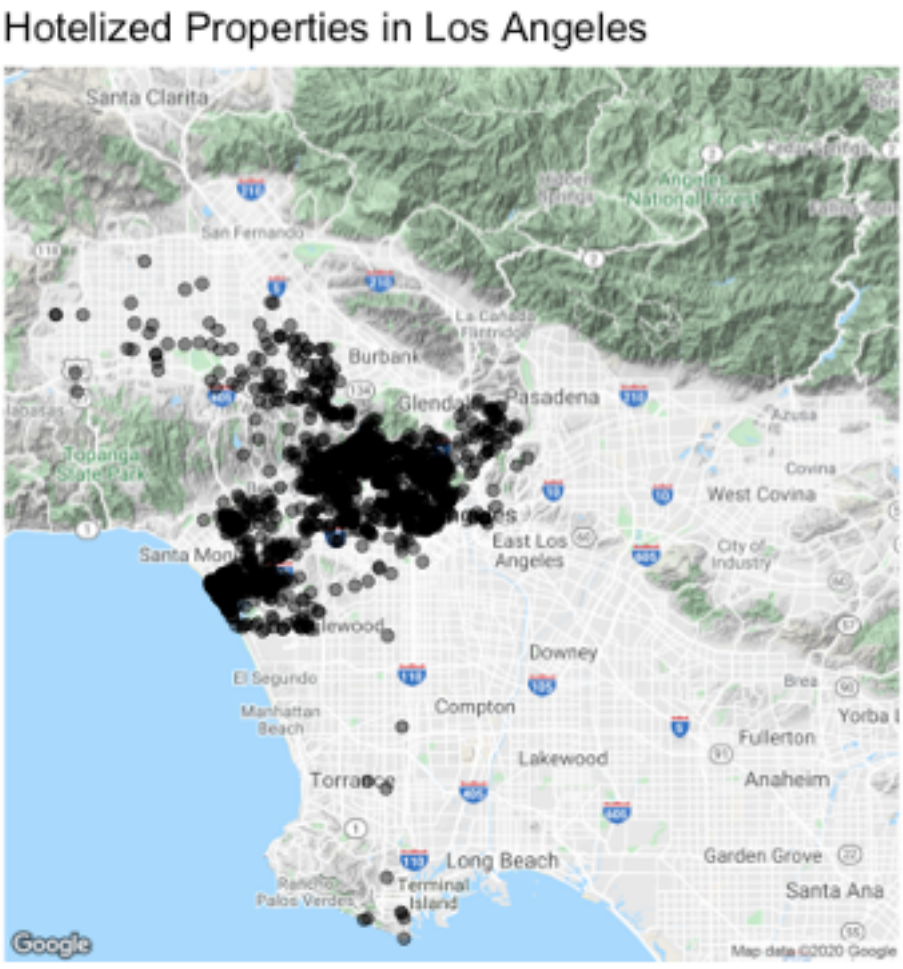

Figure 6: Hotelized Properties in Los Angeles, Mapped

Mapping of the hotelized listing and aggregating them by zip code show some similar trends witnessed when observing the density and distribution of AirBnB listings in general. Like most AirBnB listings, there is a concentration of hotelized listings along Los Angeles

neighborhoods adjacent to the coast, near famous city attractions, and near the city's downtown core. In regards to AirBnB listing categories, 1030 or 65.1% of all hotelized listings were categorized as entire homes, while 512 or 32.3% were listed as private room. Only 40 or 2.5% of all hotelized listings were categorized as shared room listings.

Zip Code	Hotelized Properties
90291 (Venice)	218
90028 (Hollywood)	179
90026 (Echo Park/Silverlake)	94
90046 (West Hollywood)	92
90068 (Hollywood Heights)	64
90066 (Mar Vista)	61
90036 (La Brea)	56
90038 (Hollywood)	54
90025 (West LA)	41
90017 (Westlake)	39

Table 3: List of the top ten zip codes with the highest hotelized AirBnB saturation.

The top ten zip codes with the highest amount of hotelized properties have 898 combined, or 40% of the total number of hotelized properties in Los Angeles. Eight of these zip codes are also part of the top ten zip codes with the highest concentration of AirBnB listings in general. The two other zip codes with high hotelized concentrations – belonging to Hollywood and Westlake – fit a similar description of the other neighborhoods, being locations adjacent to the downtown core and major city attractions. It is worth noting that the two zip codes present in the general AirBnB list and not in the hotelized list – Marina del Rey and the Sunset Strip – are also the two zip code properties with the lowest Ellis Act applications reported by the HCID.

As a subset of AirBnB listings, hotelized properties appear to follow a similar trend as AirBnB listings in general. They are most prevalent where AirBnB listings are prevalent, or where neighborhoods exhibit similar attributes to zip codes with a high AirBnB concentration. They are also not prevalent where AirBnB listings are not prevalent – in regions such

as the San Fernando Valley or San Pedro. Noteworthy absences in the top ten zip codes for AirBnB concentration – hotelized and in general – also imply that there may be some connection between hotelized properties and Ellis Act applications.

3.4 Regression Analysis

To better infer if there is a relationship between Ellis Act applications, evictions, and AirBnB listings withing a given zipcode, each of these categories were aggregated by zip code and then studied using a regression analysis. When aggregated into zip codes, a stronger correlation between AirBnB listings and Ellis Act applications exists than between AirBnB listings and evictions in general. Further analysis of regressions performed between Ellis Act applications and separate categories of AirBnB revealed that the strongest correlation occurred with private room listings throughout Los Angeles. Residual analysis revealed an outlier data point revealed a difference in dynamics between zip codes with high AirBnB concentrations.

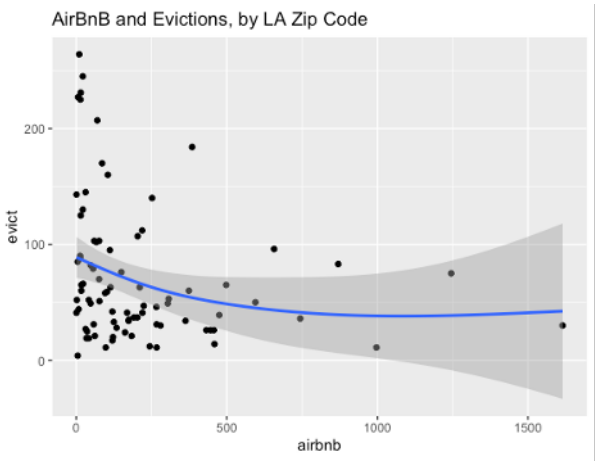

Figure 7: Scatterplot of zip codes, graphed by AirBnB listings and evictions.

A scatterplot and data summary of a plot between evictions and AirBnB concentration revealed no statistically significant relationship exists between the two dynamics. The scatterplot revealed no overarching trend, but a couple clusters of data points gathered around high eviction and low AirBnB concentration, and another with high AirBnB and low eviction concentration. The adjusted R squared for the relationship is 0.0422, and the p-value is 0.03384. While technically below the p-value benchmark of 0.05, the adjusted R-squared

value makes it clear that there is practically no direct correlation or relationship between a zip code's number of evictions and the number of AirBnBs present.

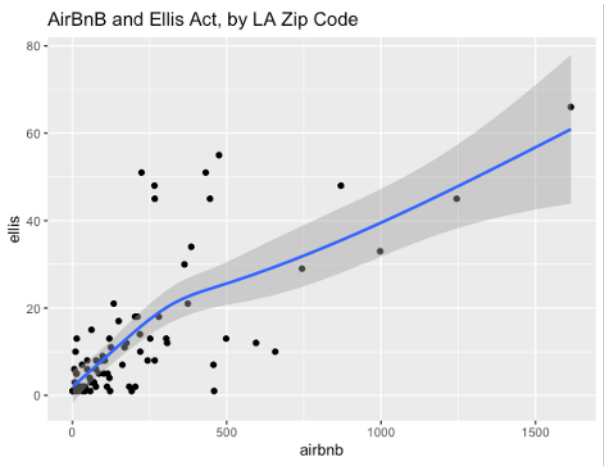

Figure 8: Scatterplot of zip codes, graphed by AirBnB listings and Ellis Act applications.

A linear model constructed between Ellis Act applications and AirBnB concentration, on the other hand, suggests a stronger correlation exists. The adjusted R-squared for the model is 0.5037, and the p-value stands at 2.016e-14, a implying a statistically significant, stronger correlation between AirBnB listings and Ellis Act applications. While an adjusted-R squared of that size is far more significant than what was observed with the evictions, it is still low enough to rule out a strong and direct correlation between AirBnB listing and Ellis Act application concentration. In regard to the level of Ellis Act activity happening within a zip code, other factors are at work.

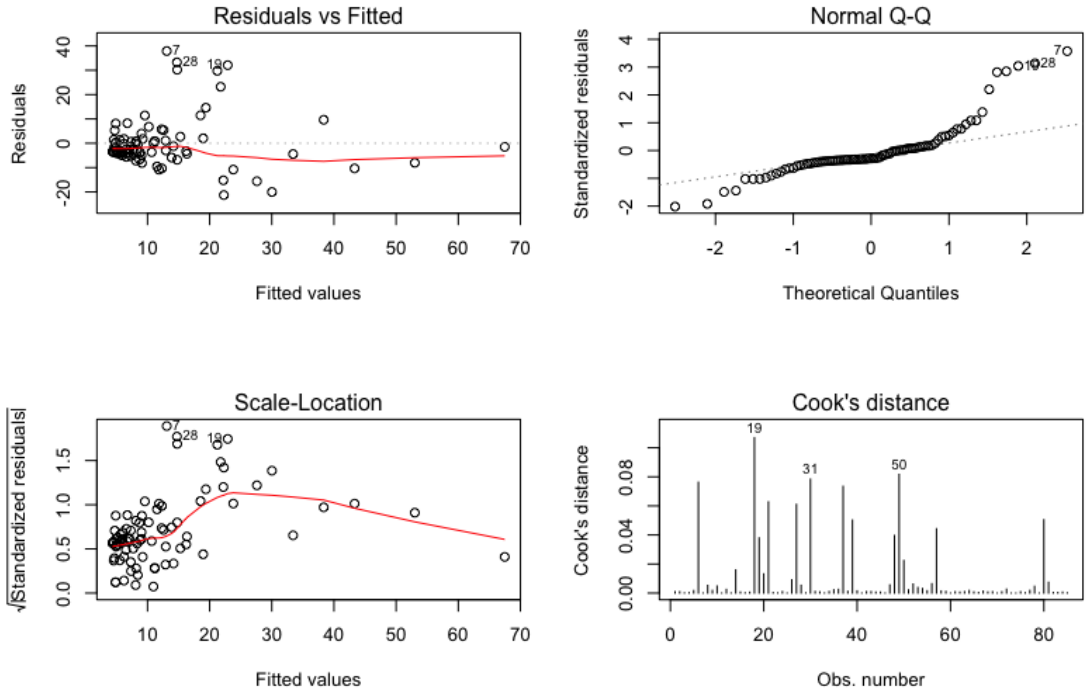

Figure 9: Residual analysis of all AirBnB listings in a given Zip Code compared to the number of Ellis Act applications.

Further residual analysis, particularly when studying the residuals vs the leverage, revealed on particular outlying data point present. The outlying data point is number 49, otherwise known as zip code 90068 or Hollywood Heights. This zip code contains a high number of AirBnB listings (657) while having a relatively low amount of Ellis Act evictions (10). In fact, removing the outlying data point from the dataset increases the adjusted R-squared to 0.528, with the p-value becoming 4.533e-15. While a relationship appears to exist between many zip codes with a number of AirBnB listings and Ellis Act applications, there also appears to be a number with low Ellis Act applications that skew the data. This implies that separate groupings of high AirBnB concentration zip codes may exist, with additional factors at work.

Regression analysis between Ellis Act applications and the concentration of different categories of AirBnB (shared room, private room, and entire home) suggest that private

room listings have the strongest correlation with Ellis Act applications. While shared room listings and Ellis Act applications appeared to have a statistically significant relationship, the adjusted R-squared value was 0.238, a significantly weaker correlation than is observed between Ellis Act applications and AirBnB listings writ large. Private room listings, however, were statistically significant and had an adjusted R-squared of 0.590, a higher correlation as compared to observing all the AirBnB listings together. Entire home listings saw a reduced adjusted R-squared at 0.434. This suggests that whatever additional factors may be involved might be related to the category concentration of different AirBnB listings.

4 Discussion

AirBnB listings are concentrated in a range of zip codes that carry some similar characteristics. They are zip codes that either line the coastline of the city, are adjacent to the downtown core, or are adjacent to major city attractions such as Hollywood or Universal Studios. Popular zip codes could share more than one of these characteristics. When it comes to hotelization properties, there is a strong linkage to a high concentration of AirBnB listings overall. When listings are compared to Ellis Act Applications and evictions, Ellis Act applications have a much stronger correlation to AirBnB listings. However this correlation does not hold for all zip codes, as there are some with high AirBnB concentration that have minimal Ellis Act applications. This suggests that other factors are at play with zip codes, and that there are two groups of Los Angeles zip codes with high AirBnB concentration where Ellis Act applications are prevalent and where they are not.

While the summary statistics and mapping data show that AirBnB listings tend to concentrate in similar regions of Los Angeles, some distinct patterns can be observed among different categories of listings. In zip codes with smaller numbers of AirBnB listings, more shared room listings can be observed – even though there is still a presence of private room and entire home listings. As the concentration of listings increase, however, private room listings and entire home listings tend to dominate in a given zip code, until entire home listings are the only observable variety of listing in highly dense zip codes. This implies that as

the market saturates in a given zip code, the listings tend to become large and encompassing of an entire unit or property.

The eviction data also shows that Ellis Act applications, as opposed to evictions in general, may be subject to different pressures than other different varieties of eviction. Distributed across zip codes evictions have a much more even distribution than Ellis Act applications, the vast majority of which comprise of less than a couple dozen in a given zip code. There is another noticeable concentration of Ellis Act applications, however, near the 50 mark. Ellis Act evictions are just one type of eviction that occurs and are bound to be less than the number of evictions occurring in general, however it is worth nothing that their density and concentration and trends do not compare with the rest evictions viewed together. This suggests that some other factors may be at play in a zip code that could be affecting the differing distribution of Ellis Act applications.

Hotelization data also reveals that hotelized listings are directly linked to private room and entire home listings, as opposed to shared room listings. Hotelization occurs in some of the most AirBnB saturated zip codes, which are often dominated by entire home listings and to a lesser extent private home listings. This is reflected in the composition of hotelized listings, a near supermajority of which are entire home listings and the rest predominantly being private room listings. This aligns with the intention of the hotelization algorithm, which is to determine whether or not a host actually lives in the space being leased. Shared rooms would likely be less appealing for a consumer interested in renting out an entire unit or home, like one would do in a hotel space. Hotelized listings thus have a strong linkage to saturation of AirBnB in a zip code, in particular the prevalence of entire home listings.

While hotelized listings are more strongly correlated with private room listings, Ellis Act applications overall have a stronger correlation with private room listings. Following up on observations in the summary statistics, regression data shows that the connection between Ellis Act applications and AirBnB saturation in a zip code is indeed stronger than that of evictions in general. That correlation, however, does not account for nearly half of the variation observed between these two factors, and certainly does not account for zip codes that have low Ellis Act applications and a high AirBnB saturation. Residual analysis re-

vealed, however, that outlying zip codes included locations associated with neighborhoods like Hollywood Heights. An upscale neighborhood known for its mansions and limited rent controlled listings, this particular type of zip code is not a zip code where Ellis Act applications would be expected in the first place. This is in direct contrast to a highly saturated zip code like Venice, which has a mixed array of apartments and houses, and has been a common site for Ellis Act evictions. Regression analysis on private room listings alone with Ellis Act evictions revealed nearly a nearly 10% in correlation strength between the two factors.

What's clear from the data, then is that whatever relationship that exists between Ellis Act evictions and AirBnB listings is not clearly defined as being just a matter of AirBnB saturation in the market. Zip codes of high saturation that exist in neighborhoods of higher socio-economic status are not going to have a high number of evictions in general. And while hotelized listings may have a connection with Ellis Act evictions, it is clear that more than just apartments that could be long term rentals are being hotelized. Mansions in the Hollywood Hills are also becoming hotelized, and those who reside there often do not fit the narrative that tenant advocacy groups shape of those being displaced.

While AirBnB may be a factor in the prevalence of Ellis Act-based evictions in a given neighborhood, it is not the sole determining factor. Further research should look into the housing value make up of each zip code, along with determining socio-economic status to see if any connection can be drawn from those factors to the ones discussed in this paper. If AirBnB categories can be rough approximations for socio-economic status – an wealthy host is more likely to lease out an entire home rather than just a shared bedroom – then there may be something to find in investigating how AirBnB does cause displacement or a reduction in housing for middle-income communities in Los Angeles. Regardless, AirBnB has clearly become a fixture in the Los Angeles housing economy, and preliminary study of its relationships with some signifiers of housing trends suggest that it should be studied further for its local economic impact.

REFERENCES

[Bar15] Bianca Barragan. "Rent-Controlled Tenants Were Evicted, Then Found Their Apartments on AirBnB." *LA Curbed*, 2015.

[BMY15] F Brousseau, J Metcalf, and M Yu. "Analysis of the impacts of short term rentals on Housing." *San Francisco, CA: City and County of San Francisco*, 2015.

[Cox17] Murray Cox. "Inside Airbnb: Adding data to the debate." *Inside Airbnb [Internet].[cited 16 May 2017]. Available: http://insideairbnb. com*, 2017.

[Dur15] Leo Duran. "Ellis Act Evictions in LA on the Rise." *KPCC, Southern California Public Radio*, 2015.

[KW13] David Kahle and Hadley Wickham. "ggmap: Spatial Visualization with ggplot2." *The R Journal*, **5**(1):144–161, 2013.

[Lee16] Dayne Lee. "How Airbnb short-term rentals exacerbate Los Angeles's affordable housing crisis: Analysis and policy recommendations." *Harv. L. & Pol'y Rev.*, **10**:229, 2016.

[Sam15] Roy Samaan. "Airbnb, rising rent, and the housing crisis in Los Angeles." *Teknik rapor). Los Angeles Alliance for a New Economy (LAANE) sayfasından erişildi: http://www. laane. org/wpcontent/uploads/2015/03/AirBnB-Final. pdf*, 2015.

[Sle17] Tom Slee. *What's yours is mine: Against the sharing economy.* Or Books, 2017.