THE IMPACT OF AIRBNB ON THE SAN FRANCISCO HOUSING CRISIS

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A Report Prepared for the San Francisco Planning Department

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EXECUTIVE SUMMARY

In November of 2014, San Francisco enacted an ordinance to regulate the short term rental (STR) market that has existed illegally since at least 2008.[1] Short term rentals in San Francisco generate enormous consternation and controversy over both their potential to disrupt the social fabric of neighborhoods and the threat they pose to the City's stock of affordable rental housing. So far, anecdotes, conjecture and political posturing dominate both sides of the public discussion.

This report seeks to infuse data and economic analysis into the public policy debate over the impact of short term rentals to rental housing in San Francisco. The analysis relies on the publicly facing data available from Airbnb, the largest STR hosting platform, demographic and economic indicators of San Francisco from surveys and a database of apartment listings from Craigslist in 2014.

This report investigates what, if any, problems short term rentals pose to rental housing supply in San Francisco in order to recommend improvements to the current legislation. In order to minimize the loss of long term rental housing while still permitting STRs, this analysis recommends that the Board of Supervisors of the City and County of San Francisco:

Increase the current limit on STR use to 120 days for any combination of hosted and unhosted STRs:

1. The vast majority of STR hosts appear to be genuine 'homesharers' who rent their space infrequently and do not impact the supply of long term rental housing.
2. Approximately 10% of hosts appear to be 'Airbnb hotels' that rent their listing for more than half of the year. The existence of these fully commercial uses and the potential for further conversions necessitate an enforceable cap.
3. It is infeasible to enforce two caps that differentiate between hosted and unhosted rentals.
4. This analysis suggests that raising the cap from 90 to 120 days will not incentivize more conversions since, at a 120 day cap, almost no vacant apartments are more profitable as STRs compared to long term rental prices.

Remove the restriction on rent controlled tenants earning more revenue than they pay in monthly rent:

1. Even though at least 30% of rent controlled tenants could pay for their entire rent through STR income, there is no reason to suggest that these tenants would have rented their spare bedrooms to long term roommates in the absence of STRs. In effect, it is unclear whether any housing is being removed from the market due to the use of STR by rent controlled tenants.
2. This provision hurts low income rent controlled tenants who might benefit greatly from the extra income generated through a STR.

Give regulators the powers necessary to enforce the law:

[1] Cutler, K. *San Francisco Legalizes, Regulates Airbnb with 7-4 Vote, Lots of Amendments*. 2014. Tech crunch piece Retrieve at http://techcrunch.com/2014/10/07/san-francisco-airbnb/

1. Currently, the law is completely unenforceable and market trends indicate that an unregulated STR market will lead to the loss of more long term rentals. In order to make the law enforceable, the enforcing agency needs to be able to require short term rental hosting platforms to regularly provide non-anonymized data and/or to fine hosting platforms each day for listing illegal short term rentals.

AUTHOR'S NOTE

This report was prepared by Alex Marqusee as part of the program of professional education at the Goldman School of Public Policy, University of California, Berkeley. This report is submitted in partial fulfillment of the course requirements for the Master of Public Policy degree. The judgments and conclusions are solely those of the author, and are not necessarily endorsed by the San Francisco Planning Department, the Goldman School of Public Policy, the University of California, or by any other agency.

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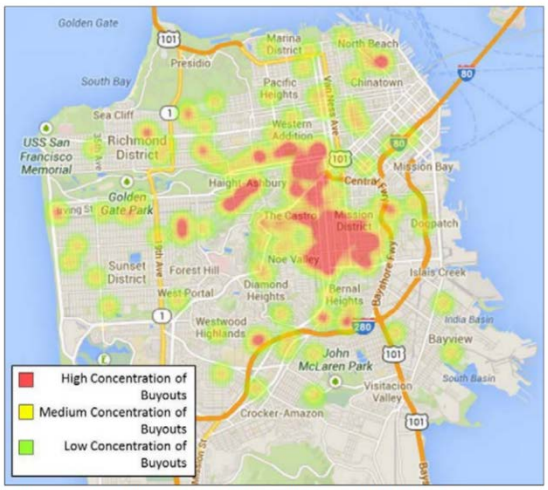
On a personal note, I am thankful for the support and friendship of Ethan Guy during this process without whom I would have eaten half as many meals, forgotten to laugh at all my mistakes and never gotten the chance to meet our dear friend George.

INTRODUCTION

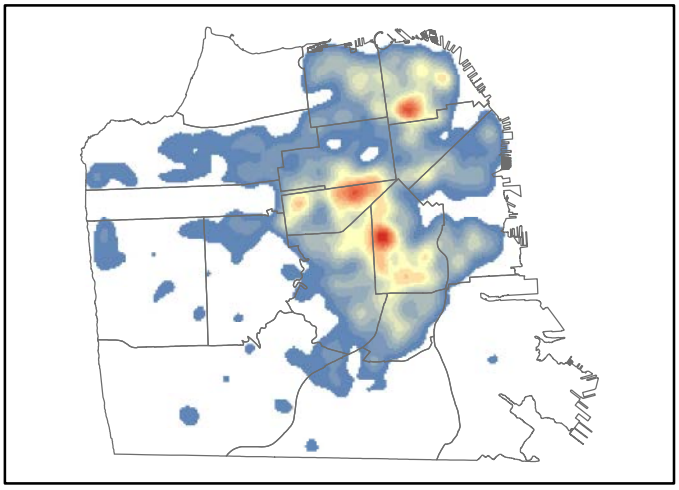
In November of 2014, San Francisco enacted an ordinance to regulate the short term rental (STR) market that has existed illegally since at least 2008.[2] Short term rentals in San Francisco generate enormous consternation and controversy over both their potential to disrupt the social fabric of neighborhoods and the threat they pose to the City's stock of affordable rental housing. Opponents of STRs claim that the commercial use of residential housing remove units from the long term rental market and increases rents. If nothing else, short term rentals have become a flashpoint for the larger housing affordability crisis and opponents claim that they contribute to the gentrification of deep rooted communities and the displacement of vulnerable communities:

Exhibit 5: Map of Reported Tenancy Buyouts, 2013-14



Source: San Francisco Tenants Union. 2014 as of February 28, 2014

Distribution of Airbnb Listings (December 2014)



On the other side of the debate, proponents of 'homesharing' claim that the income generated through STRs allows them to remain in their homes and maintain their quality of life despite the rising cost of living. They also cite internal Airbnb studies that purport to link economic growth to increased tourism made possible by short term rentals. So far, anecdotes, conjecture and political posturing dominate both sides of the public discussion.

This report seeks to infuse data and economic analysis into the policy debate over the impact of short term rentals to rental housing in San Francisco. STR potentially pose a variety of problems in addition to the impacts to housing but these issues are outside the scope of this report.[3] Instead, this report takes a step back from the political and anecdotal arguments to collect and evaluate the available public data and determine what, if any, problems short term rentals pose to rental housing supply in San Francisco in order to recommend improvements to the current legislations.

[2] Tech crunch piece http://techcrunch.com/2014/10/07/san-francisco-airbnb/

[3] A brief overview of the potential problems STRs may pose outside of threats to the housing supply may be found in the Appendix.

The San Francisco Planning Department commissioned this report in response to the lack of credible data sources or analysis from which to recommend an appropriate regulatory framework. This report relies on an analysis of publicly facing data collected from the website of the largest STR hosting platform – Airbnb, which comprises an estimated 80% of the STR market – as a proxy for the entire short term rental market.[4] Readers unfamiliar with short term rentals should begin with the background section included in the Appendix. Additionally, readers interested in an in-depth presentation of statistics describing the Airbnb market in San Francisco and of the limited academic research on STRs should refer to the 'Marqusee Memo' submitted to the San Francisco Planning Commission on April 16th, 2015.[5]

The rest of the report first introduces and explains the three mechanisms by which STRs might reduce the supply of rental housing. Next, the report presents the potential threat of STRs in the context of the larger rental housing and hotel markets. The loss of rental housing from STRs is then evaluated to determine the current magnitude of STRs' impact as well as the potential threat for the future. Finally, the report recommends legislative changes. In addition to the background section, the Appendix contains a brief discussion of other problems to tenants and neighborhoods that short term rentals pose, a description of data sources and methods, and results from simulations and regressions.

[4] Please refer to the Marqusee Memo.

[5] The Marqusee Memo can be accessed as Exhibit B of the SF Planning Department's submission to the SF Planning Commission Website on proposed amendments to short term rental legislation. The document can begins on page 30 at http://commissions.sfplanning.org/cpcpackets/2014-001033PCA.pdf. A video record of the public debate over short term rentals as well as a brief presentation of the Marqusee Memo can be found at http://sanfrancisco.granicus.com/MediaPlayer.php?view_id=20&clip_id=22581 and the short term rental discussion begins at 2:50.

HOW COULD STRS IMPACT RENTAL HOUSING?

An increase in the commercial use of residential housing through STRs poses several potential problems. While leasing lodging on a short term basis isn't a new phenomenon, the increased frequency of STRs facilitated by online hosting platforms combined with unenforceable regulations raises the possibility of new, larger impacts. This section introduces the mechanisms by which short term rentals may reduce the supply of rental housing. The Appendix contains a brief discussion of how short term rentals my pose problems for tenants and for the quality of life in neighborhoods.

PERMANENT CONVERSIONS TO STR HOTELS

Landlords could choose to convert long term units to short term rental hotels. This might stem from landlords seeking the greatest financial return from their rental unit if short term rentals prove more profitable than long term rentals. Even if STR are less profitable than long term rentals, landlords may seek to avoid the complications of rent control and eviction protections and use STRs to generate almost as much profit as long term rentals.

INCREASED WITHHOLDING OF RENTAL UNITS

Landlords in San Francisco currently withhold rentals from the market for a number of reasons. San Francisco has a higher incidence of vacant rentals held off the market than comparable cities. [6] The ability to cover operating costs through STR income may encourage more landlords to withhold units from the long term rental market or to withhold units for longer periods of time.

OVERCONSUMPTION OF HOUSING (LOSS OF ROOMMATES)

Owners and tenants may remove rental capacity from the market by converting bedrooms to 'private room' STRs that they would otherwise offer to long term tenants. In some scenarios, a tenant may purchase more rental housing than they could normally afford by renting part of their new apartment as a STR. Some tenants may value the lack of a permanent roommate more than the financial security of a long term lease and the disruptions associated with STRs.

In other scenarios, current residents may have an additional bedroom that they could rent to a long term tenant but decide to rent on a short term basis. This may happen to avoid rent control, the potential for being locked into a year-long contract with a noxious tenant or if they value the flexibility of not having to always have a roommate. In addition, owners may have illegal secondary units that they believe can't be rented on a long term basis but would be appropriate for a STR.

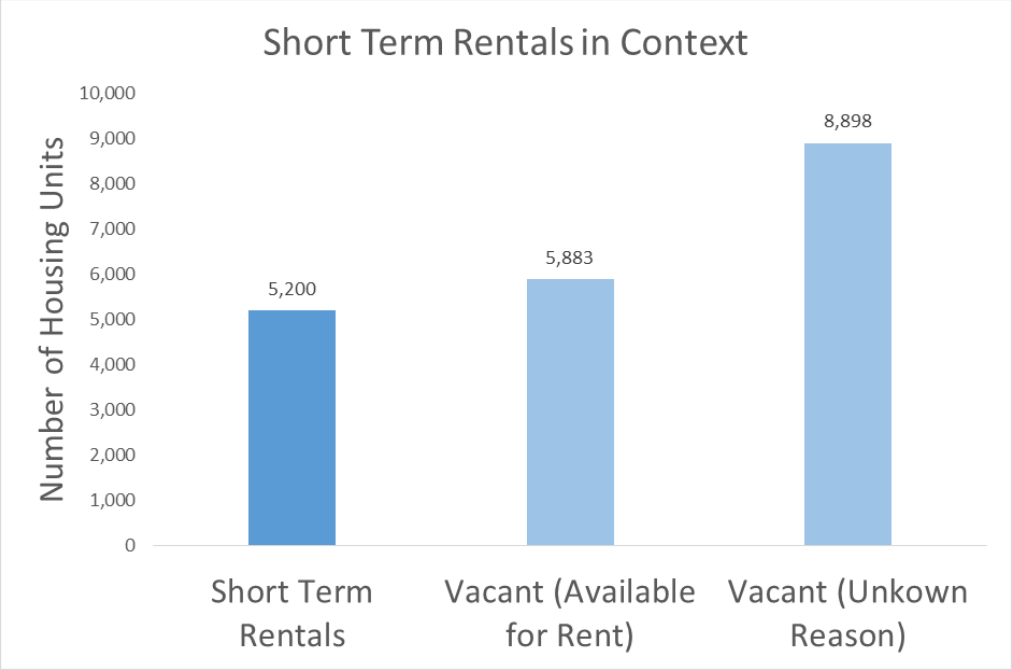
[6] SPUR,*Non-Primary Residences and San Francisco's Housing Market.* 2014. Retrieved from http://www.spur.org/sites/default/files/publications_pdfs/SPUR_Non-Primary_Residences.pdf Page 9 indicates that the vacancy rate in San Francisco is 60% higher than in comparable cities.

EVALUATING IMPACTS TO RENTAL HOUSING FROM STRS

This section evaluates the extent to which each of the mechanisms described above currently impacts rental housing as well as its potential to reduce the supply of rental housing in the future. First, the section begins with a description of current and projected short term rental market in San Francisco in order to put the potential threat to rental housing in context.

PUTTING THE THREAT OF STRS TO RENTAL HOUSING IN CONTEXT

The removal of even a moderate proportion of rental units could have a large impact on the availability of rental housing in San Francisco because of the current very low rental vacancy rates. The table below presents data from the census in 2013 on the number of vacant units in San Francisco as compared to the number of apartments listed on Airbnb at the end of 2014. Please note that there are certainly more STR listings on other STR hosting websites.



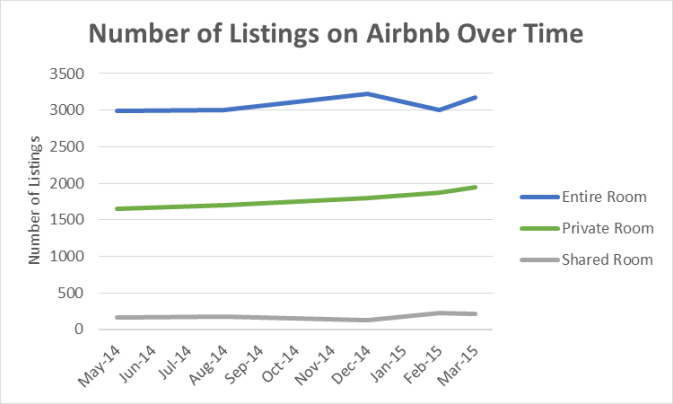
The vacancy data from the census shows that there were at least 5,883 rental units available in 2013 and another 8,898 vacant units that the census staff was unable to characterize and might have been available for rent. Compared to the limited available rental housing, if some STRs remove rental housing then STRs could substantially reduce the supply of available rental housing.

Interviews with housing experts and economists revealed that, either through signaling or by directly reducing the stock of low-cost housing, small changes in supply can have discernable effects on rental

prices, particularly when rental vacancy rates are low.[7] In other words, the actual loss of even a few units or the appearance of units being removed from the market can increase prices in areas where vacancy rates are very low. In 2013, the census estimated an overall rental vacancy rate of 2.5% as illustrated above.[8] However, some submarkets such as Pacific Heights, Russian Hill, the Western San Francisco neighborhoods and the Haight-Ashbury neighborhood have vacancy rates lower than the city wide average.[9] The loss of even a few long term rentals in these areas could exacerbate the housing crisis in San Francisco in these submarkets with lower vacancy rates.

SUPPLY OF SHORT TERM RENTALS

There are approximately 3000 'entire units' and another 2000 'private or shared room' short term rentals available on Airbnb.[10] There are approximately another 1200 listings on VRBO but it's unclear how many of these listings are repeated on both platforms.[11] For Airbnb, this number has not changed significantly over the past year.

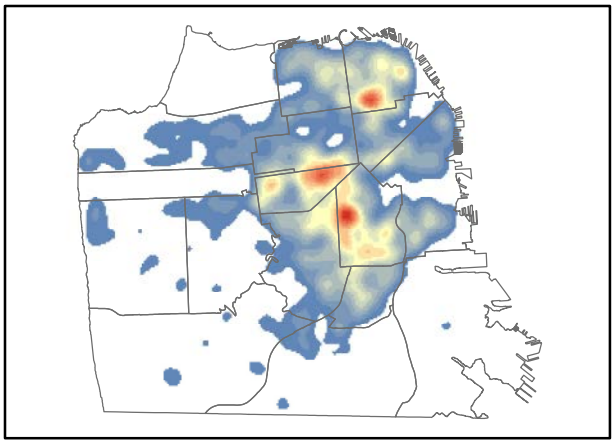


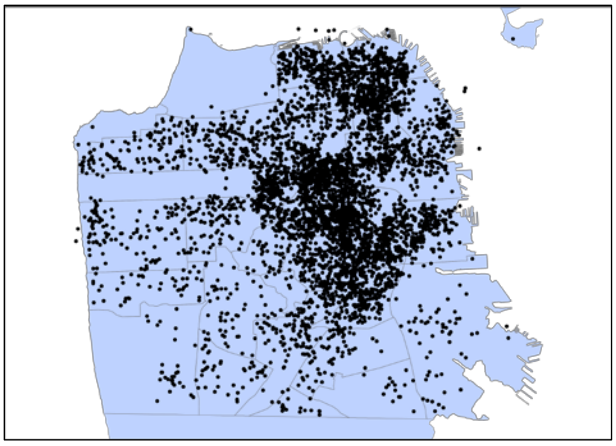
The number of actual properties available for rent is lower than the number of listings. There are certainly fake listings as well as listings where the same housing unit lists both a private room and an entire unit separately.[12] In addition, approximately one fifth of rentals appear to have never be rented.[13]

Geographically, Airbnb listings concentrate in the downtown and central neighborhoods. The maps below show a 'heat map' of the concentration of listings on the left and each Airbnb listing rendered individually as a point on the right:

Maps of Airbnb Listings in San Francisco (December 2014)

[7] Interviews conducted by Ann Hollingshead and shared with Author. The original work can be accessed from: Hollingshead, A. (Forthcoming: 2015). "When and How Should Cities Implement Inclusionary Housing Policies?" Prepared for the Cornerstone Partnership. University of California, Berkeley.
[8] American Community Survey, 2013 1 Year Sample, Table DP04.
[9] Paragon. *San Francisco Bay Area Apartment-Building Market.* April 2015. Retrieved from http://www.paragon-re.com/Bay_Area_Apartment_Building_Market
[10] Averages from multiple scrapes of Airbnb's website. Please see the Marqusee Memo.
[11] Data scrape from http://www.antievictionmappingproject.net/airbnbmap.html
[12] Email from Gus Dolan to Author describing experience creating a fake listings.
[13] Analysis from multiple scrapes of Airbnb's website. Please see the Marqusee Memo.

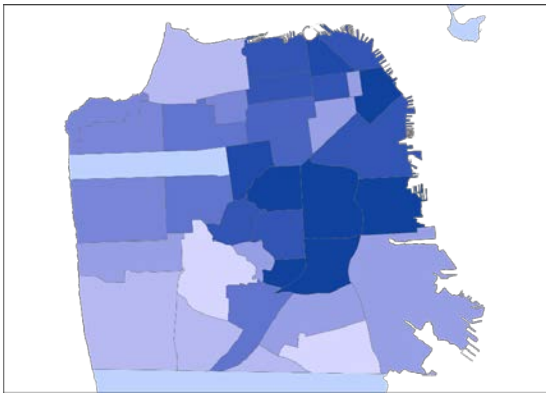




This higher concentration of units in the central and northern neighborhoods remains even after controlling for the higher density of housing units in those neighborhoods.

Map of Airbnb Listings Normalized by Number of Housing Units (Dec. 2014)

The map to the left presents the number of listings on Airbnb in each neighborhood divided by the total number of housing units in that neighborhood. Darker shades of blue represent neighborhoods with higher concentrations of Airbnb listings. Controlling for housing density in this way confirms that the concentration of Airbnb units in the northern and central neighborhoods is not due simply to a larger total number of housing units in those areas.



DEMAND FOR SHORT TERM RENTALS

A lack of good data precludes a perfect accounting of the demand for short term rentals in San Francisco. However, it is possible to approximate the demand for STRs by corroborating several data sources. In 2014, a survey of 4,682 visitors to San Francisco found 76 visitors who were staying in "peer-to-peer lodging" of some kind through Airbnb, VRBO, Homeaway or a related service. From this number, the survey estimated that 130,000 visitors stayed in peer-to-peer lodging in 2014.[14] In 2012, a study commissioned by Airbnb reported that the highest demand in any one month was 1,576 individual bookings in August.[15]

[14] Destination Analysts. *San Francisco: Visitor Industry Economic Impact Summary, 2014.* Published by the San Francisco Travel Association provided to the author

[15] Rosen Consulting Group. *Short-Term Rentals and Impact on the Apartment Market.*2013. Retrieved from http://www.rosenconsulting.com/products/rentalreport.html . This report accessed Airbnb data for 2012 but offers no transparency into their methodology. The website 'Journalist's Resource' described this study as an internal Airbnb report.

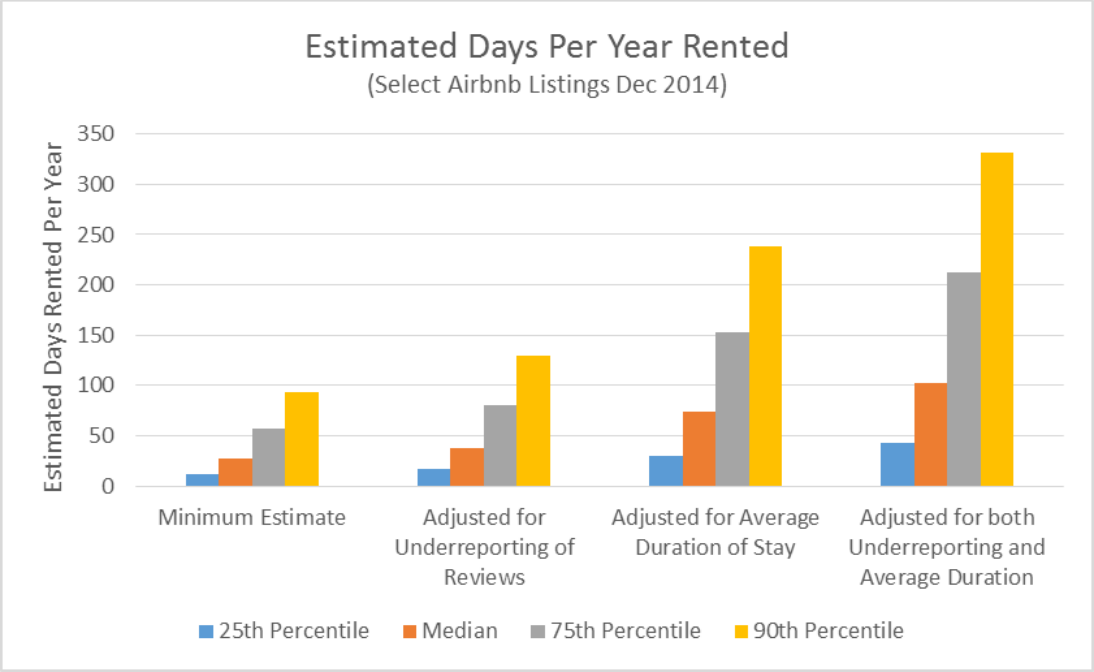
In addition, data collected from Airbnb's website allow for an estimation of the number of days guests book each listing (i.e. the occupancy rate). There are four methods to approximate the true occupancy rate per listing. These methods provide a range of estimated occupancy rates to account for the fact that guests underreport reviews and that many guests stay for longer than the minimum stay required by the host.[16,17]

These calculations create the following distributions in the chart below of the number of days per year that Airbnb listings have been rented. The groups represent increasingly less conservative estimates

Methods for Estimating Occupancy Rates
1. Restrict the analysis to only include units for which an occupancy rate can be reasonably estimated: those active for more than six months that also have a minimum required stay of fewer than 6 days. Other units may show much higher occupancy rates that in reality because they reflect the higher occupancy rates during the summer or have recently changed their minimum required stay to much higher than 6 nights. These restrictions lead to a conservative estimate. 2. Calculate the minimum occupancy rate by multiplying the number of reviews per year by the minimum length of stay required by the host. 3. Create less conservative estimates of the true occupancy rate that account for the underreporting of reviews and average stays longer than the minimum required by the host. a) Multiply by the minimum length of stay and inflate the number of reviews to account for underreporting. Airbnb stated in 2012 that only 72% of guests leave reviews. b) Multiplying by the average length of stay instead of minimum required stay. Three sources from 2012 and 2014 state that, on average, guests stay approximately 5 nights per trip. c) Use both the average length of stay instead of the minimum required and inflate for the underreporting of reviews.

arranged from left to right. For each estimation technique, the value of the quartiles and the 90th percentile visualizes the range of the days of occupancy realized by Airbnb listings as of December 2014.

[16] Multiple sources over several years point to an average duration of stay of 5 nights in San Francisco most recently the Destination Analysts report cited earlier found an average length of stay of 5.1 nights.
[17] Chesky, B. (9/7/2012) *What percent of Airbnb hosts leave reviews for their* guests. Retrieved from: http://www.quora.com/What-percent-of-Airbnb-hosts-leave-reviews-for-their-guests



The above chart shows how difficult it is to accurately estimate occupancy rates for Airbnb units with the very highest occupancy rates. It is possible to say that the top ten percent of most frequently booked Airbnb Units are likely occupied between a quarter to three quarters of the year. However, the data does not support more precise estimates due to potential biases. For instance, the recent survey presented above reported that the 67 visitors to San Francisco staying in peer-to-peer lodging stayed for an average of 5.1 nights. In reality, this average reflects a distribution that might be different for different types of rentals. STRs that resemble hotels may have a very high number of reviews and bookings but each booking is only for a few days. Conversely, STRs that cater to business travelers staying for two week conferences may have fewer reviews and bookings but each stay is for a week or more. If these two scenarios represented most listings, then the conservative estimates would underestimate the occupancy rate of STRs catering to business travelers and the less conservative estimates would overestimate the occupancy rate of STs that resemble hotels. However, given that it is impossible to know whether that scenario is true, this report assumes that the distribution of the duration of stay is unrelated to the number of reviews a unit has. Regardless, these estimates represent the best approximation of the occupancy rates of STRs in the absence of data provided directly by the hosting platforms.

REGULATIONS AND ENFORCEMENT

The current San Francisco law restricts the use of short term rentals to permanent residents. There is no restriction on the number of days a host can rent their unit while present ('hosted rentals') but there is a 90 day cap on the number of days a host can rent their unit while not present ('unhosted rentals'). Legal operators of short term rentals must be registered with the San Francisco Planning Department, have a business license, and hold liability insurance for at least $500,000. In addition, tenants of below market

rate rentals are barred from offering STRs and tenants in rent controlled apartment are restricted from generating more revenue per month than they pay in rent. [18]

The legislation charges the San Francisco Planning Department with enforcement but the legislation fails to provide enough tools to meaningfully enforce the law for several reasons. First, it is very difficult to verify whether or not an applicant is a permanent resident. School districts for years have run into great difficulty investigating parents for misrepresenting their permanent addresses.[19,20] Second, it is virtually impossible to monitor whether or not a host is present or not during the rental. Third, it is unclear how the Department can monitor the current rent that rent controlled tenants pay or the total revenue or profit generated by any listing. Finally, verifying that a host has not exceeded the cap on unhosted rentals may prove to be impossible without data from the short term rental platform. The Planning Department may be able to catch hosts exceeding the cap on occupancy by analyzing the tax receipts submitted to City but it is unclear at this point whether or not that is possible.

PROJECTING THE SHORT TERM RENTAL MARKET

The market for STRs in San Francisco, much like any other lodging market, will change over time depending on the underlying fundamentals of the local economy as well as the prices, demand and supply for its substitutes and complementary goods.

The very limited evidence suggests that short term rentals substitute for lower-priced hotels. An econometric study by researchers from Boston University found that a 10% increase in the supply of Airbnb listings in Texas caused a 0.35% decrease in the monthly revenue for hotels in the same area.[21] They also found that the impact on revenue was not distributed evenly amongst all hotels but disproportionately impacted lower-priced hotels. Even though this is just one study, it does confirm at least the link between short term rentals and traditional hotel lodging in a city with similar housing pressures to San Francisco.[22]

Currently, hotels in San Francisco report record high occupancy rates and analysts project that this trend will continue in the near term. The local travel industry association SF Travel reports that many companies who host conventions and large meetings in San Francisco book large blocks of hotel rooms

[18] For more information, please see the SF Planning Department's FAQ on STRs at: http://www.sf-planning.org/index.aspx?page=4004

[19] Tucker, J. *SF school district goes after residency cheats.* 2010. Retrieved at: http://www.sfgate.com/news/article/SF-school-district-goes-after-residency-cheats-3167934.php

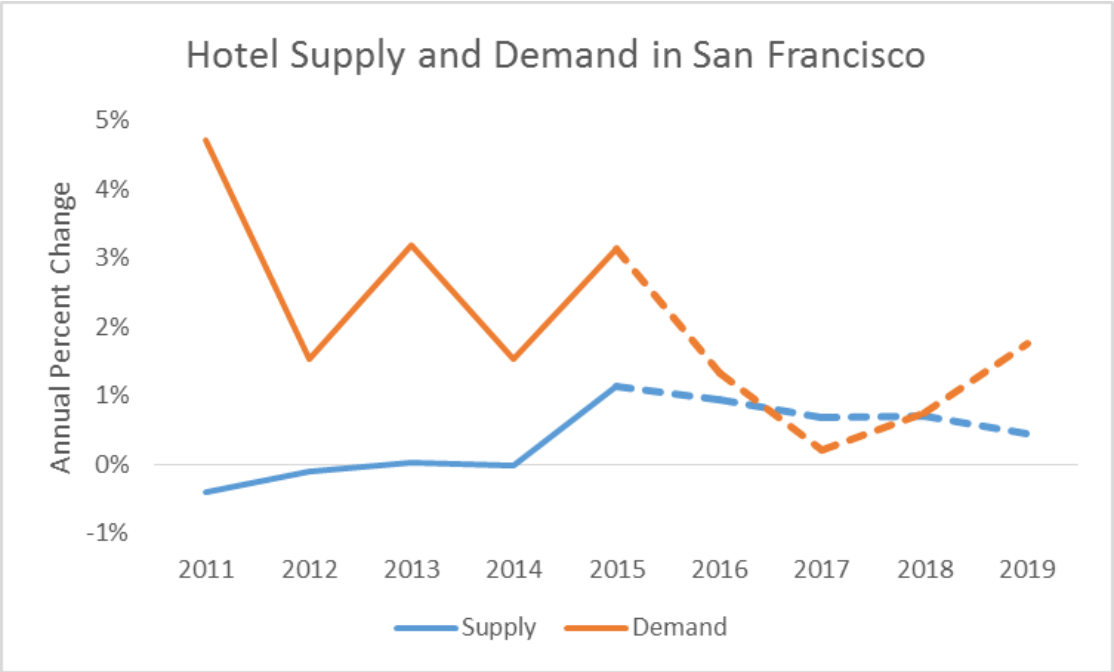
[20] Gafni, M. *Bay Area public school districts spying on kids in border control battle.* 2015. Retrieved from http://www.mercurynews.com/my-town/ci_27084199/

[21] Zervas et al. *The Rise of the Sharing Economy: Estimating Impact of Airbnb on the Hotel Industry.* 2015. Retrieved from http://people.bu.edu/zg/publications/airbnb.pdf

[22] BBC Research and Consulting. 2014 Comprehensive Housing Market Analysis. 2014. Retrieved at http://austintexas.gov/sites/default/files/files/NHCD/2014_Comprehensive_Housing_Market_Analysis_-_Document_reduced_for_web.pdf

fifteen years in advance.[23] PKF Hospitality Research recently reported a city-wide occupancy rate of 85% which belies the fact that during the high season hotels are essentially completely booked.[24,25] Occupancy rates are similar for both upper-priced and lower-priced hotels. These record high occupancy rates mean that there is little excess supply to accommodate any increase in the number of visitors travelling to San Francisco. Instead, visitors will have to either stay in lodging outside of the city or turn to STRs.

A projected increase in demand for lower-priced hotels combined with rising hotel prices and a limited supply of new hotel rooms suggests that demand for short term rentals will increase in the near term. Tourism Economics' projections illustrate the increasing mismatch between rising demand for hotel lodging and the anemic supply response: [26]



The chart above confirms that demand is projected to outstrip supply over the next few years and that the average daily rate for hotel rooms in San Francisco will rise from approximately $200 per night to $250 per night over the next two years. However, the changes in supply and demand are not projected to be even spread across all types of hotels.

[23] Sciacca, A. *Here's where 1,600 hotel rooms are planned in San Francisco.* 2015. Retrieved from http://www.bizjournals.com/sanfrancisco/blog/2015/04/san-francisco-hotel-projects-tourism-slideshow.html?page=all

[24] PKF Hospitality Research, A CBRE Company. San Francisco Econometric Forecast of U.S Lodging Markets. March-May 2015 Edition. Provided to the author by the SFTA.

[25] Occupancy rates for hotels varies seasonally. Data from 2010-2012 illustrates clearly that occupancy rates in the last spring and the summer are approximately ten percentage points higher than the annual average.

[26] STR. *Tourism Economics, Forecast – San Francisco/ San Mateo, CA*. February 2015. Provided to author by SFTA.

Demand for lower priced hotel is projected to grow at an even higher rate than upper-priced hotels at approximately three percent over the next few years. Supply is only projected to increase by the 195 lower-priced hotel rooms in the two hotels currently under construction. To put that in context, there are currently 7691 lower-priced hotel rooms in San Francisco. Even if the hotel rooms under construction come on-line immediately, that only represents a 2.5% increase in supply resulting in a modest increase in occupancy rates in lower-priced hotels. The increased occupancy for lower-priced hotels and the rising prices relative to STRs suggests that consumers will increasingly substitute towards short term rentals as a substitute for increasingly expensive and unavailable lower-priced hotels.

In addition, there is another market for STRs that includes visitors, new residents and business travelers interested in lodging that falls somewhere between a hotel and a formal, longer-term sublease. These consumers are searching for vacation rentals, corporate housing or temporary housing for a couple of weeks while they search for something permanent. These consumers are not substituting away from hotels but rather appear to be taking advantage of short term rentals hosting platforms as one of the only ways to these extended stay rentals. For business travelers at least, newspaper accounts indicate a growing acceptance of STRs and companies that handle reimbursements have started to accept Airbnb as a valid expense item.[27][28]

Finally, upper-priced hotels comprise over two thirds of the supply of hotels in San Francisco and charge approximately $250 per night on average.[29] Prices for upper priced hotels are projected to increase to nearly $300 per night by the end of 2017 and there is no supply of upper-priced hotels planned for at least the next three years. Demand, however, is projected to increase for upper-priced hotels. Entire apartment STRs in comparison only charge about $250 on average and private room rentals only charge about $120 all before cleaning fees which average about $80-$90 and a 20% tax and fee surcharge.[30] It is unclear whether the prices of STRs will rise alongside of hotel prices since there is conceivably a much larger pool of potential STR suppliers who might be induced to enter the market by rising demand.

The analysis presented here suggests that rising prices and reduced availability for upper-priced hotels will lead more affluent consumers to search for more expensive STRs, lower-priced hotels or lodgings outside of San Francisco. In addition, if STRs do substitute in large part for lower-priced hotels, then the increasing relative affordability of STRs and the scarcity of available lower-priced hotel rooms suggests that more and more consumers will look to short term rentals. At the very least, there is no evidence to suggest that current market conditions that have led to worries about STRs removing rental housing will lessen in the near future.

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[27] Concur. *Concur triplink now integrates with Airbnb to provide visibility into booking and spend.* Retrieved from https://www.concur.com/blog/en-us/concur-triplink-now-integrates-with-airbnb-to-provide-visibility-into-booking-and-spend

[28] Said, C. *Business Travelers opt for Airbnb listings instead of hotels.* Retrieved from http://www.sfgate.com/travel/article/Business-travelers-opt-for-Airbnb-listings-6182342.php

[29] PKF reports that 85.1% of hotel rooms in the Market Street submarket are 'upper priced' hotels while 67.8% of hotel rooms in the Nob Hill/Wharf submarket are 'upper priced' hotels.

[30] Please see the 'Marqusee Memo'

EVALUATING THE LOSS OF RENTAL HOUSING FROM SHORT TERM RENTALS

PERMANENT CONVERSION TO STR HOTELS

Short term rentals may remove housing from the long term rental markets through the conversion of rental units to full-time, commercial STR hotels. Unfortunately, data limitations preclude a perfect estimation of the number of STR hotels. Data scraping offers a large amount of useful information to understand the Airbnb market but does not offer data on the exact number of bookings or the length of those bookings. It is possible to get a general sense of the magnitude of the number of commercial users through the occupancy rates estimated earlier. However, these estimates rely on assumptions about the number of guests that leave reviews and the length of each stay. With the qualification that these estimates are mildly conservative approximations, the following table shows the numbers of suspected commercial units defined as listings with an occupancy rate greater than 50%:

Estimated Number of Commercial Airbnb Units: All Airbnb Units (Dec. 2014)

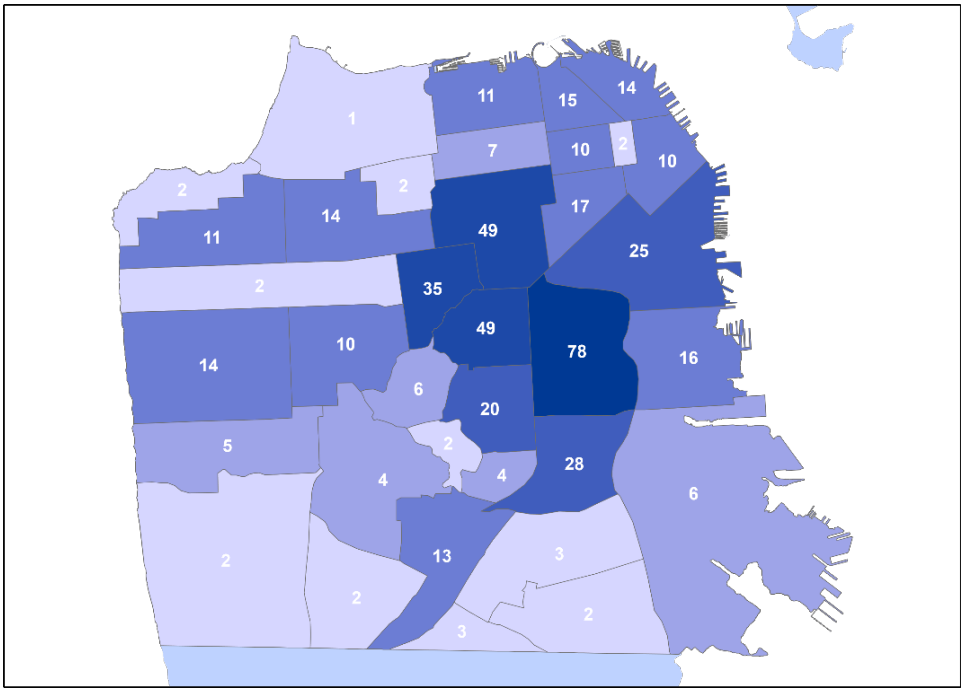
Type of Unit	Occupancy Rate Above 50% (Average of 5.1 Days per Stay)	Occupancy Rate Above 50% (Most Conservative Calculation)
Entire home/apt	413	23
Private room	303	10
Shared room	9	0
Total	725	33

However, some of these units may only reflect a high occupancy rate because they have been listed for a very short amount of time or had a few bookings just after entering the market. It is also possible that listings that joined Airbnb in the spring of 2014 benefited from the increased demand that occurs each year during the high tourist season in summer. The next table only looks at Airbnb rentals that have been listed for at least six months to exclude this source of potential bias:

Estimated Number of Commercial Airbnb Units: Airbnb Units Listed for Minimum Six Months (Dec. 2014)

Type of Unit	Occupancy Rate Above 50% (Average of 5.1 Days per Stay)	Occupancy Rate Above 50% (Most Conservative Calculation)
Entire home/apt	282	18
Private room	211	8
Shared room	4	0
Total	497	33

The above table confirms that there are Airbnb hosts who rent out their listing very frequently and appear to be operating STR hotels. This distribution of listings is not even across the city:



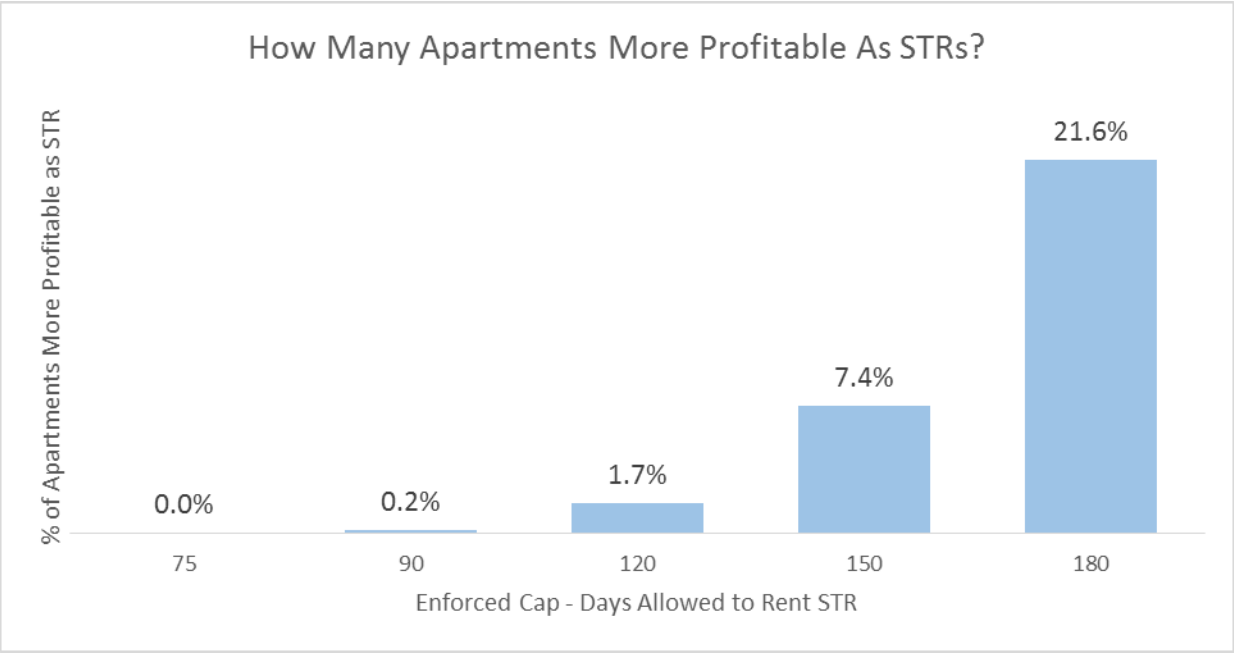
The map above shows the number of potentially commercial Airbnb listings in each neighborhood. Potentially commercial Airbnb users are defined as listings with an estimated occupancy rate greater than 50% which have also been listed for more than six months.

The number of commercial units is currently approximately 500 or 10% of total listings. Simulating the choices landlords face when choosing between a STR and a traditional long term rental helps project whether this number may rise in the future. The following analysis seeks to answer the question: how many days would a landlord have to rent out an Airbnb unit to generate more revenue than the equivalent traditional long term rental. The resulting simulation creates a distribution of the 'Break Even Point' by comparing actual, advertised long term rental prices to short term rents calculated to match the apartment's attributes (location, bedrooms and bathrooms). A full explanation of the methods, the regression model and regression results for predicting STR, the model for the 'Break Even Point' and the results of a simulation analysis confirming these statistics is available in the Appendix.

Methods for Calculating "Break Even Point"

1. Compare short term rents and long term rents for 8500 apartments listed on Craigslist in 2014. A regression analysis created a predicted short term nightly rent for each listing based on its location, number of bedrooms and number of bathrooms.
2. Assume that operating a short term rentals costs 18% of total revenue. Airbnb charges hosts a 3% processing fee and the two most prominent management companies (Pillow and Guesthop) charge 15% of revenue to manage all aspects of running a short term rental. This underestimates the true cost of running a short term rental.
3. Calculate the occupancy rate required for each short term rental to generate the same income as the apartment listed on Craigslist. Expressed as 'Days Occupied until STR is More Profitable' which multiplies the occupancy rate by 365 to convert into number of days out of the year.

Applying the estimated short term rents to a sample of apartments listed on Craigslist creates a distribution of 'Break Even' occupancy rates expressed as the number of days in a year a short term rental would have to be rented to be as profitable as a comparable long term rental. The median value suggests that, on average, there is an incentive for rational landlords to convert long term units to short term rentals if the unit could be rented as a short term rental for more than 213 days out of the year. The distribution also shows that nearly all of the rental units sampled would have to be rented for more than 120 days a year to be more profitable as a short term rental:



The resulting analysis suggests that there are many properties that are vulnerable to conversion to a short term hotel because they would be more profitable as a full time short term rental than as a long

term rental. [31] The potential for an increase in demand for STRs established earlier suggests that in the absence of effective regulation San Francisco should expect more conversions of long term rentals to commercial STR hotels.[32]

In summary, this analysis suggests:

1. Some hosts currently run commercial Airbnb units in San Francisco. The number is not entirely clear, but it appears to be approximately five hundred units or 10% of total listings concentrated in the downtown and central neighborhoods.
2. In an unregulated market, the majority of landlords have an incentive to convert their long term rentals into short term rental hotels if they believe they can achieve occupancy rates above approximately 213 days a year.
3. If the current spatial distribution of commercial units continues, the central and downtown neighborhood will have many more units removed from the long term rental market. As a result, there will be an increase in prices in those areas due to the current very low rental vacancy rates.

There may be landlords who still choose to convert their empty apartments to STRs even if they can't generate as much income as a long term tenant. The following section investigates this possibility.

INCREASED WITHHOLDING OF RENTAL UNITS

STRs may remove rental housing from the long term market if the income from a STR allows landlords to hold more rental units off the market or hold them off the market for longer. This scenario does not pose a problem if the government is able to enforce the requirement that hosts permanently reside in the unit being rented as a STR. However, it is difficult to imagine a city agency ever being able to audit whether a resident uses an apartment as their primary residence through reasonable methods.

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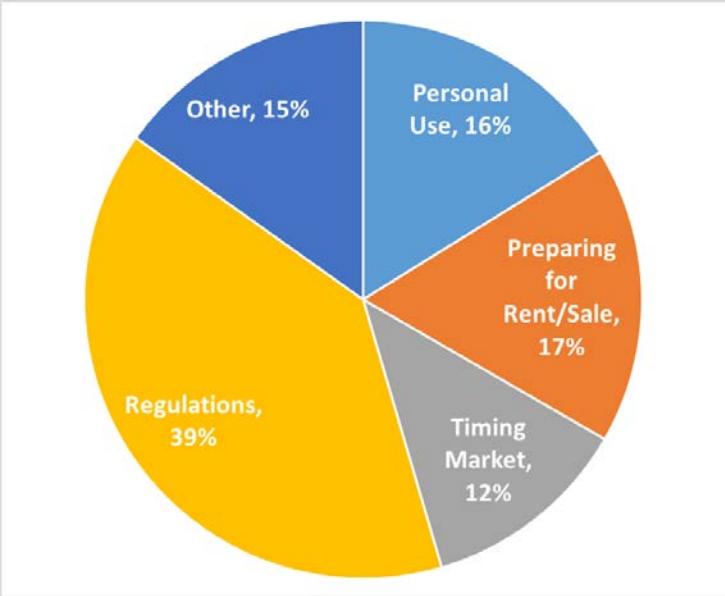
[31] This calculation is only as good as the estimated short term rent. The analysis included simulations of a selection of neighborhoods to confirm that these findings are not dues to poor estimates. This method ran two thousand versions of this same analysis by altering the estimated short term rents each time by a random amount of the margin of error. The resulting distributions confirm these findings and can be found in the Appendix.

[32] The available evidence suggests that approximately 10% of current Airbnb listings operate as full-time, commercial Airbnb hotels and that the relative long term and short term prices are such that many more rental units could be converted profitably to short term rentals in an unregulated marketplace. However, the above simulation analysis fails to incorporate landlords' expectations of future income streams when making a choice between long term and short term rentals and so may misstate a rational landlord's decision making process.

A more accurate estimate of a rational landlord's decision to rent a unit as a short term rental or long term rental projects the expected revenue of a long term and short term rental over many years. The income from a long term rental is varied by the expected turnover of tenants each year and the resulting increase in rents by the allowable increase from the rent board or a resetting of rates to the market price. A full description of the methods and results is available in the Appendix. The simulation confirms the earlier results that, on average, a rational landlord would only prefer short term rentals if she were able to achieve occupancy rates similar to a San Francisco hotel.

Landlords in San Francisco already hold units off the market for a variety of reasons. In 2003, Bay Area Economics surveyed landlords in San Francisco in part to determine why landlords withhold rental units:

The pie chart to the left illustrates that many units are held off the market without a plan to rent them out in the near future because of a fear of regulations. The small sample size precludes any definitive claims but does establish the real possibility of landlords running short term rentals in order to hold more units off the market or hold them off the market for a longer period of time.



Landlords only need to cover their operating expenses through a STR in order to hold a unit off the market without incurring losses. The 2013 Survey of Income and Operating Expenses in Rental Apartment Communities found that the average apartment cost just over $4,500 annually to operate.[33] In comparison, a study commissioned by Airbnb in 2012 established that the average Airbnb listing generated approximately $6,772 in income annually.[34]

[33] Lee, C. *2013 Survey of Operating Income & Expenses In Rental Apartment Communities*. National Apartment Association. Retrieved from http://www.naahq.org/sites/default/files/naa-documents/income-expenses-survey/2013-Income-Expenses-Summary.pdf Page 60

[34] This data point actually represents the average revenue realized by Airbnb hosts over the last 12 months and not over the 2012 calendar year. It is unclear whether this represents gross revenue or revenue net of fees, taxes and Airbnb charges listed on the website. Data from Rosen Consulting Group study.

It is possible to estimate the income currently generated by each listing through information available on Airbnb's website including: the number of reviews, the nightly price, the minimum required stay and how long the unit has been listed. However, the resulting metrics understate the true gross revenue and are inexact approximations.[35] Overall, these numbers should be interpreted as only general approximations of the magnitude of the revenue that listings generate. In addition, this statistic creates misleading results when applied to some units and so the dataset is restricted.[36]

Methods for Estimating Hosts' Revenue

1. Calculate the most conservative estimated monthly revenue (number of reviews per month multiplied by the minimum required length of stay multiplied by the price per night).
2. Calculate progressively less conservative estimates of monthly revenue by:
    a) Multiply by the minimum length of stay and inflate by how many users did not leave reviews. Airbnb stated in 2012 that only 72% of guests leave reviews
    b) Multiplying by the average length of stay instead of the minimum required stay but use the original number of reviews per month. Sources from 2012 and 2014 state approximately 5 nights as the average length of stay.
    c) Adjust for both the average length of stay instead of the minimum and for the underreporting of reviews.

The following table presents the distribution of monthly revenues from the four different estimation techniques and are presented top to bottom in order from most to least conservative. Please note that these are estimates meant to give an approximation of how much revenue listings generate each month on average:

Estimates for Hosts' Monthly Revenue: Select Airbnb Units (Dec. 2014)

Adjustment to Estimate:	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile

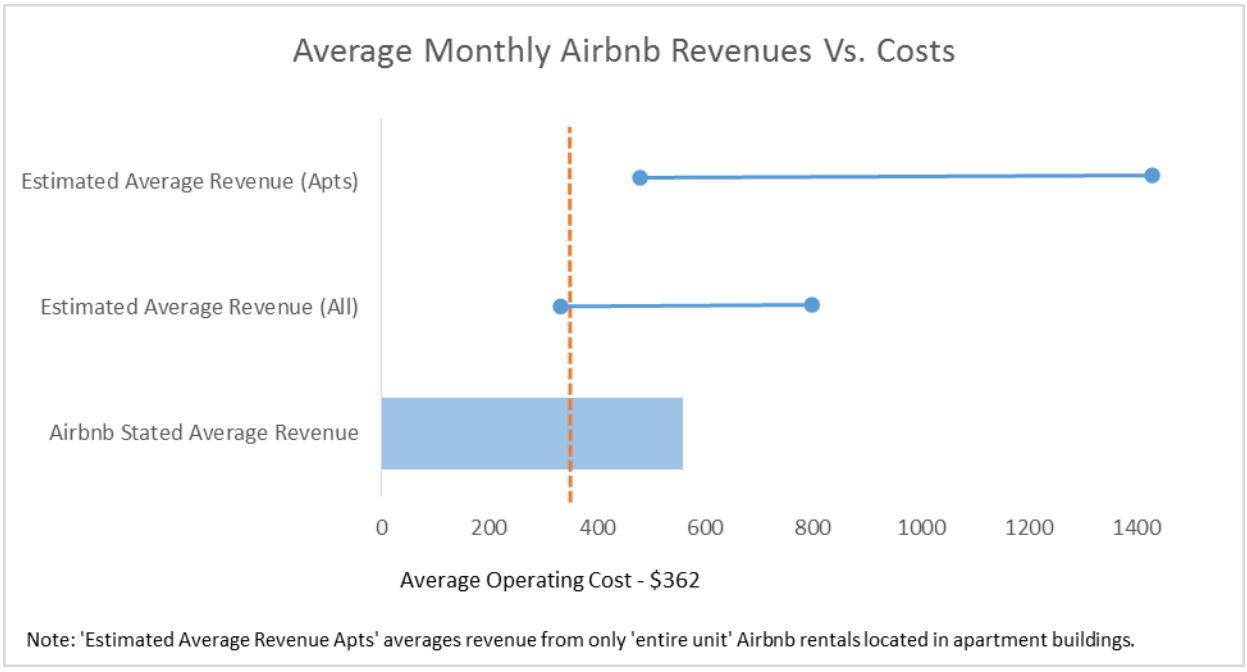
[35] The metric understates the true revenue since not all guests leave reviews. In addition, assuming that all guests stayed for the minimum number of nights only provides the minimum revenue. Finally, some guests might have changed their prices and minimum stay requirements over the lifetime of the rental. This makes the resulting statistics less accurate.

[36] The following statistics are misleading when calculated for certain units and so the data is restricted to avoid biasing these results. First, these statistics exclude units that have been offered for fewer than six months to remove revenue numbers that might only reflect the occupancy rates during San Francisco's high tourist season during the summer.[36] In addition, it is clear that some units have changed their minimum nights required for a reservation since the unit's reviews per month multiplied by the minimum nights for reservation exceed the number of days in a month. So, these statistics exclude units with a minimum required stay of more than five days to very conservatively avoid the potential for including these inaccurate estimations. These two restrictions reduce the total units for this analysis from 5148 units to 2752 units.

Nothing (Most Conservative Estimate)	$150	$356	$780	$1,364	$1,800
Number of bookings inflated for missing reviews	$208	$495	$1,083	$1,894	$2,500
Average stay of 5 nights instead of minimum requirement	$398	$956	$1,964	$3,189	$4,137
Both increased length of stay and inflated for missing reviews (Least Conservative Estimate)	$553	$1,328	$2,727	$4,429	$5,746

When annualized, the more conservative estimate that just corrects for the under reporting of reviews illustrates that most Airbnb units in San Francisco generate more revenue than the average operating cost of about $4,500 (or approximate $380 monthly). Both the upper range of the estimated revenue that Airbnb units currently generate as well as the average revenue that Airbnb reported in 2012 exceed the national average of long term operating costs.

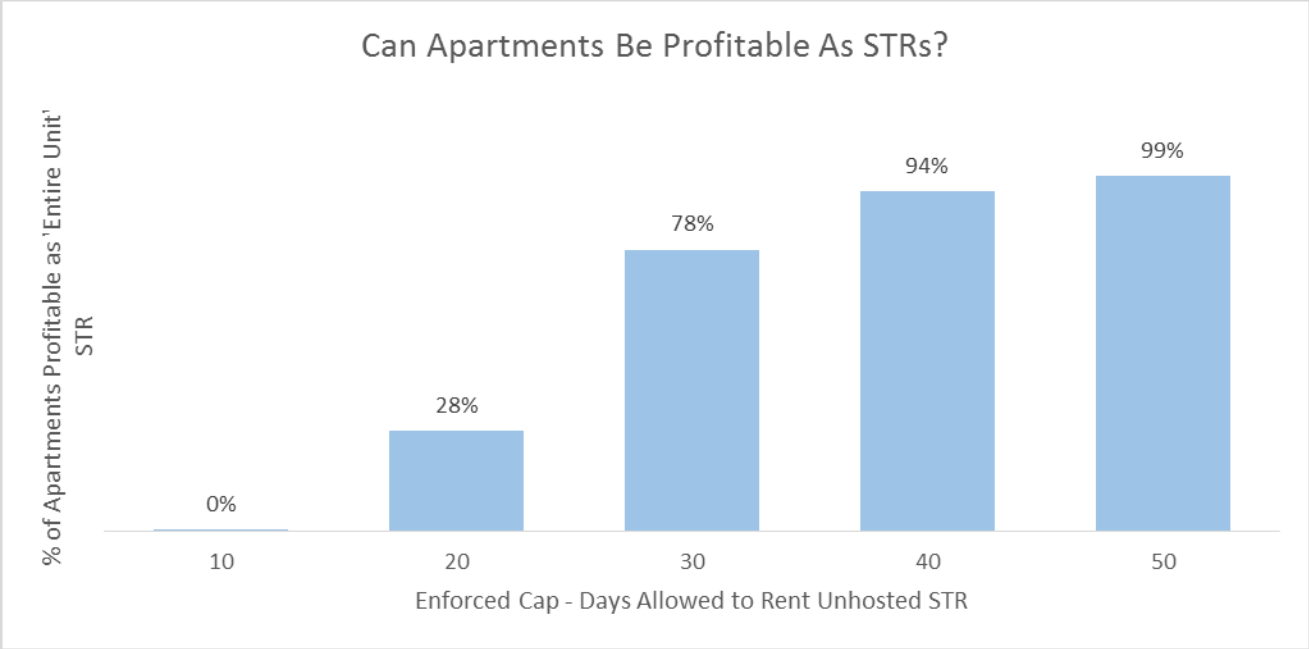
Estimating revenue for only Airbnb listings in apartment buildings illustrates that STR operators in apartment buildings currently generate higher revenues than they pay in annual operating costs.



The chart above establishes that the average Airbnb STR located in an apartment building that is rented out as an entire apartment generates more revenue than the average annual cost of operating an

apartment unit.[37] However, these calculations of revenue do not include the costs associated with running a short term rental (managing reservations, scheduling cleaning services, purchasing extra insurance, etc.).

Analyzing apartments listed on Craigslist establishes that the majority of units could be held off the market at no loss to the landlord through the use of short term rentals. The costs of operating any unit listed on Craigslist is estimated as the square footage multiplied by 4.98, the national average cost per square foot for rental operations.[38] Using a similar methodology to the Break Even Point analysis gives a distribution of how many days a short term rental would need to be rented to break even with costs. [39] This calculation compares the average cost not to the estimated revenue but to the estimated income that includes the costs associated with running at STR.[40]



The above chart shows that, on average, apartments in San Francisco only need to be rented for approximately 24 days on Airbnb to cover operating costs. The majority of sampled Craigslist

[37] This analysis restricts the Airbnb dataset to only those units that report being located in an apartment. Approximately two thirds of the units report being located in an apartment while most of the rest report being in a house. It appears impossible to estimate a reasonably consistent average operating cost for the owner of a home in San Francisco and so this analysis only uses units in apartments.

[38] Lee, C. *2014 Survey of Operating Incomes & Expenses in Rental Apartment Communities.* 2014. Retrieved from http://www.naahq.org/sites/default/files/naa-documents/income-expenses-survey/2014-Income-Expenses-Summary.pdf

[39] For this analysis: $O = {}^{M}/_{P_{ST}}$ where O is the occupancy rate, M is the long term operating costs calculated by square foot, and P_{st} is the fitted value for the short term rental net of short term operating costs.

[40] This includes accounting for both the Airbnb processing fee of 3% as well as 15% as the estimated cost of managing a STR over and above long term operating costs.

apartments only need between 19 and 29 days to cover operating costs. This analysis does not suggest that this many apartments would be removed from the long term rental market if STRs were completely unregulated. Instead, this chart suggests that nearly all of the apartments that were listed on Craigslist in 2014 could be profitable as a STR if they were rented for more than fifty days.

In summary, this analysis suggests:

1. Currently, most Airbnb STRs generate more income than they incur in long term operating costs. This is especially true for Airbnb's that are located in apartment buildings.
2. Landlords have the ability to hold many units off the rental market without incurring operating costs by using Airbnb in an unregulated market. On average, this analysis estimates that apartments in San Francisco only need to be rented for 24 days as an Airbnb rental to cover operating costs.

OVERCONSUMPTION OF HOUSING

The 'overconsumption of housing' made possible by short term rental income threatens long term rental housing by reducing the number of bedrooms available to long term tenants. Essentially, a tenant will rent a higher quality house or apartment (more expensive neighborhood, more bedrooms, more amenities, etc.) than they would otherwise choose or be able to afford only because they can rely on the additional income generated through renting part of their space as a STR. Under current regulations, a registered host can rent out a spare bedroom for an unlimited amount of time.

It is possible to investigate how many tenants might be currently removing bedrooms from the long term rental market by analyzing the estimated occupancy rates of hosts offering 'private rooms'. The analysis presented earlier showed that approximately half of the suspected commercial users of Airbnb offered private rooms. However, the average operator of a private room on Airbnb generates somewhere between $200 and $700 per month which is substantially below the median rent per bedroom of $2,800 in San Francisco.[41] This suggests that few hosts of private rooms fully recoup the market rate rent of the bedroom used as a STR.

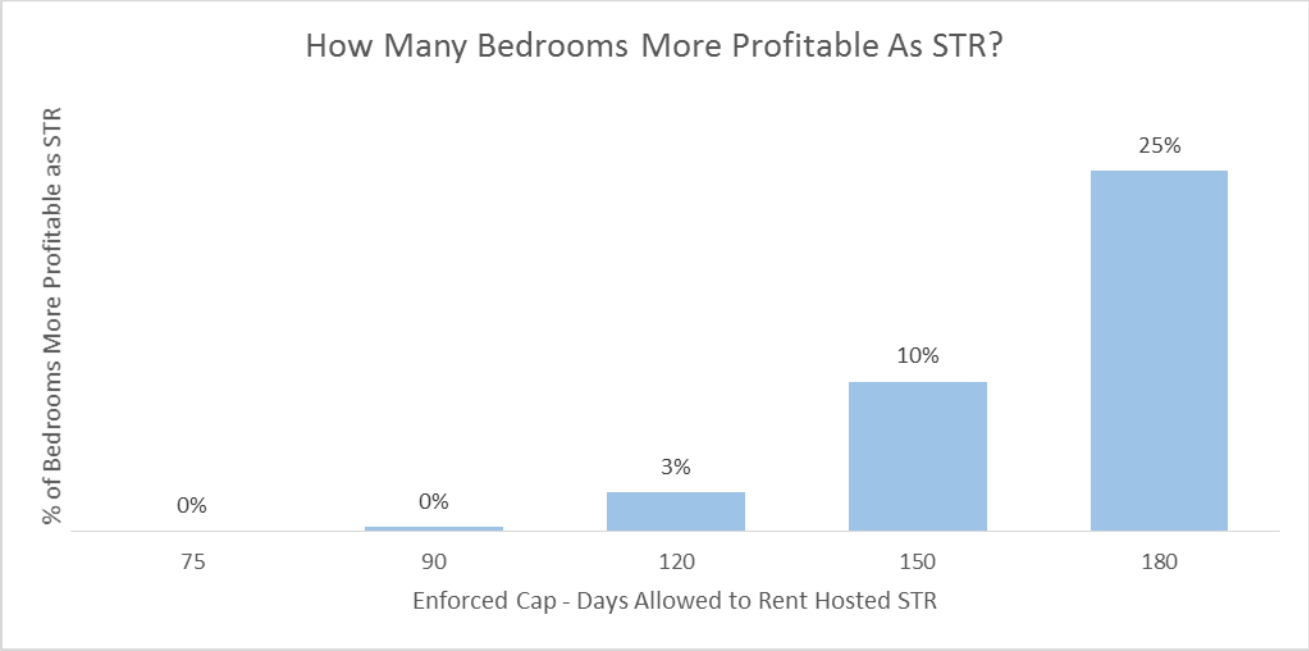
In addition, comparing Airbnb prices to the price per bedroom of apartments listed on Craigslist gives an estimate of how easily a tenant could recoup the long term rent of a bedroom through a STR. Using the same methodology as estimating the days needed to cover long term operating costs, [42] the distribution

[41] Median rent from: http://blog.zumper.com/wp-content/uploads/2015/03/March-2015-National-Rent-Report.pdf

[42] For this analysis: $O = {R_{LT/Bed}}/{P_{ST}}$

Where: O is the occupancy rate, $R_{LT/Bed}$ is the rent per bedroom of craigslist apartment (annualized), and P_{st} is the fitted value for a private room short term rental net of short term operating costs (annualize). This analysis is restricted only to craigslist apartments that have more than one bedroom. In reality, many residents will double

below presents the number of days a host would need to rent out their spare bedroom to generate the same revenue as the market rent of that bedroom:



The chart above illustrates that the very few tenants could recoup the full market cost of a bedroom through a STR if they rented the STR for fewer than 120 days. The average master tenant renting a new apartment would have to rent out a spare bedroom for an average of 254 days a year to generate as much revenue as a long term tenant. Even if a new master tenant is willing to pay a 20% premium for full control over the apartment, the average private room listed on Airbnb would still need to be rented for 203 days to generate as much revenue as a long term roommate.

However, this analysis is confounded by a number of factors:

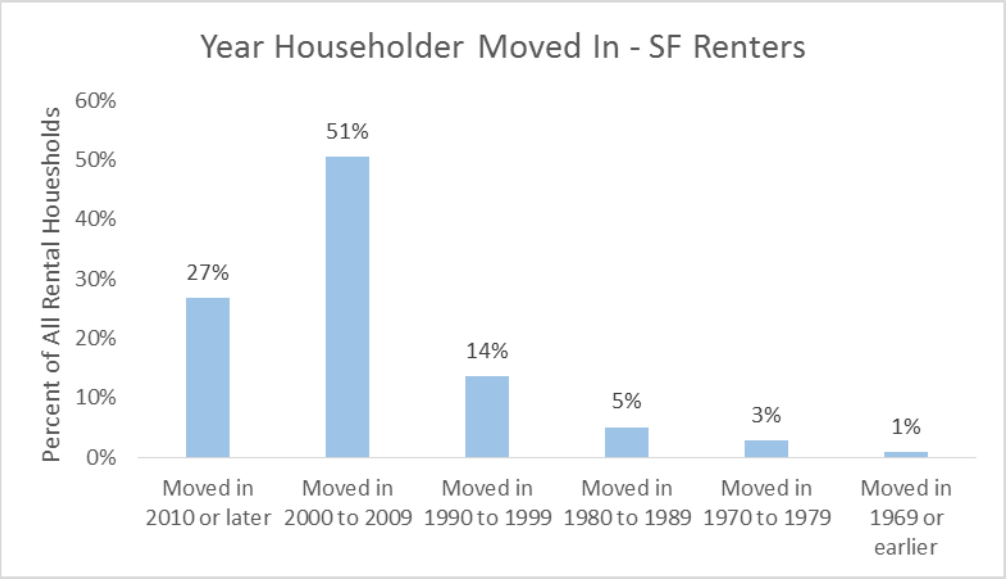
1. The analysis may underestimate the profitability of Airbnb 'private room' rentals by analyzing only apartments from Craigslist that listed more than one bedroom. In reality, many apartments listed as '1 Bedroom' may in fact contain two or more sleeping spaces that could be rented as a STR. In this way, the cheapest apartments have been removed from this analysis which may have been more profitable as a private room STR at lower occupancy rates.
2. Hosts may choose to overconsume housing without recovering the entire amount of foregone rent. A master tenant could highly prefer having more control over the entire unit and be willing to recoup substantially less than she could have earned with a long term roommate.
3. Not all hosts offering private rooms would have rented those bedrooms to long term tenants if STRs weren't possible. This could be because the host is the tenant of a rent controlled

up in smaller apartments. This analysis may understate the profitability of renting out a private room by not including those situations.

apartment and doesn't need the extra income for living expenses. The owner of a non-rent controlled house might not value the additional income from a long term tenant more than the trouble of having that tenant. Finally, owners might be willing to rent out an illegal unit as a short term rental but be unwilling or unable to rent out the unit on a long term basis due to a lack of a full kitchen or minimum safety requirements.

4. Tenants who have lived in their unit for a long time might benefit from rent control and pay substantially below market rates. For these tenants, the above calculations would vastly underestimate the profitability of renting out a bedroom. The analysis still holds for evaluating the choice a rent controlled master tenant makes when deciding between short term rentals and a long term roommate who could be charged market rent. However, master tenants in rent controlled apartments might be able to make a lot of profit from short term rentals and may choose to do so if they value control over their space more than maximizing revenue.

The following analysis investigates this possibility that master tenants of rent controlled apartments may more easily be able to profit greatly through a STR and eschew offering those rooms to long term roommates. The potential for rent controlled tenants to do so depends on the size of their discount on rent due to rent control. The census reports that 84% of rental units are in buildings built before 1980 which means the vast majority of rental units in San Francisco are most likely covered by rent control.[43] Given that most renters are covered by rent control, the following chart illustrates that many renters are likely receiving deep discounts on rent because they have lived in rent-controlled apartments for a long time:



[43] 2013 American Community Survey, 5 Year Sample, Table B25036.

The longer a household has stayed in their rental unit the deeper the discount they currently receive. The following table shows the current rent paid by tenants in 2013 as reported by the American Community Survey and the number of apartment available at that price on Craigslist during 2014: [44]

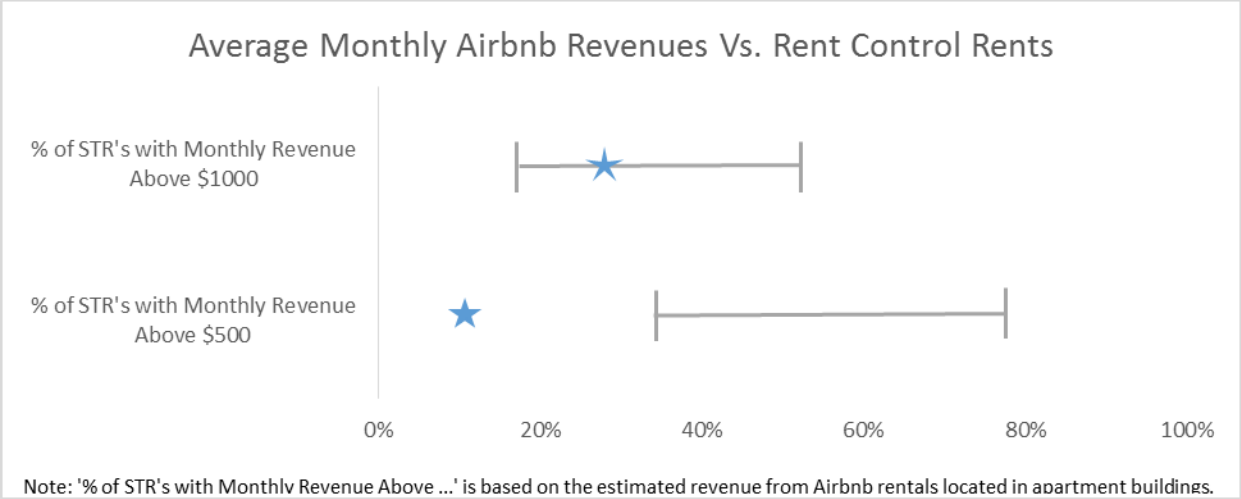
	1 Bedroom Apartments		2 Bedroom Apartments	
Monthly Rent	**% of tenants paying this rent**	**% of vacant apartments available at this rent**	**% of tenants paying this rent**	**% of vacant apartments available at this rent**
$1 to $500	10%	0%	3%	0%
$500 to $1000	24%	1%	9%	0%
$1000 to $1500	23%	2%	10%	0%
$1500 to $2000	26%	6%	12%	2%
$2000 +	17%	91%	15%	98%

The table above demonstrates that a large percentage of tenants pay far less in rent than the current market price. This is especially true for two bedroom units which may be more likely to have extra room for a private bedroom short term rental.

The following chart shows the range of estimates of average revenue of Airbnb units in apartment buildings in San Francisco that generate at least $1000 or at least $5000 dollars a month. The blue stars indicate the percentage of rent controlled apartments that pay less than a $1000 or less than $500 a

[44] Apartment data from Authors calculations of craigslist data scraped repeatedly during 2014 and cleaned for duplicates. ACS Data from the 2013 American Community Survey 3 year Sample.

month in rent.



The chart above demonstrates that there is a high likelihood that many rent controlled households that offer short term rentals generate more gross revenue than they pay in monthly rent. The chart shows that approximately 30% of rent controlled households (which is in turn approximately 25% of all rental households) could generate more in monthly gross revenue than they pay in monthly rent.

Proponents of restricting the income generated through STRs for tenants of rent controlled apartments allude to either the increased likelihood of lost roommates or the general unfairness that rent controlled households can more easily profit through a STR. However, these claims are tenuous at best.

First, when opponents of STRs cite a general unfairness of a rent controlled tenant generating profit from a STR they fail to mention to whom this situation is unfair. The landlord does not receive any more or less rent when the master tenant becomes a STR host. In fact, the landlord may benefit if they are able to evict the tenant for cause for breaking their lease and then rent the apartment at the market rent. The situation is also not unfair to the general public or to prospective tenants since if the apartment turned over the rent would reset to market rates and the benefit to rent control would be lost to all. The only plausible 'unfairness' would be to residents who might have been roommates had STRs not existed. However, this isn't the most likely outcome. Most master tenants paying less than $1000 in rent are likely neither rent burdened and nor do they need the income from a long term tenant to meet rent or living expenses. Also, the economics literature on the distribution of rent controlled housing has demonstrated that rent control does not distribute benefits just towards low income residents but rather distributes benefits across all income classes.[45,46] There is little to support the claim

[45] Gyorko, J. and Lineman, P. *Equity and Efficiency Aspects of Rent Control: An Empirical Study of New York City.* 1987. Retrieved from http://www.socsci.uci.edu/~jkbrueck/course%20readings/gyourko%20and%20linneman2.pdf

[46] See Jenkins, Blair's *Rent Control: Do Economists Agree* for a review of the literature.

that rent controlled master tenants would rent out their spare bedrooms to long term tenants in the absence of STRs.

The above evidence does however suggest that rent controlled tenants are more easily able to profit from STRs than new tenants who may be choosing to 'overconsume' housing. However, since rent controlled tenants are most likely not removing bedrooms from the market, there is no long term housing lost to protect through STR regulation.

In sum,

1. It is not possible to determine how many bedrooms are taken off of the market by the 'overconsumption' of vacant rental units but the relative prices of STRs and market rate long term rents suggest that this scenario is unlikely.
2. Although long-tenured rent controlled tenants can easily profit from STR, the distribution of the benefits of rent control means that rent controlled tenants might not be removing housing through STRs.
3. In an unregulated market, this analysis suggests that the average new tenant have an incentive to remove a bedroom for STR use off the long term market if they are able to rent that room for at least 250 days. The analysis also suggests that no tenants will be able to fully cover their rental costs if they rent their spare bedroom for fewer than 100 days. This result hold true even if you assume tenants are willing to pay a 20% premium for not having a permanent roommate.

RECOMMENDATIONS FOR REGULATING STRS

This report established that short term rentals currently impact rental housing in San Francisco through the existence of commercial STRs and the likelihood that landlords withhold more rental units using STR income. In addition, the profitability of STR compared to long term rentals makes the loss of more long term units a worrisome possibility in the context of a very constrained rental market and rising demand for STRs. This section outlines recommendations for how San Francisco should regulate STRs based on the preceding analysis.

This reports recommendations are responses to a few of the major choices currently facing policy makers as they debate proposed amendments to the original legislation:

Recommendations:

Normative Criteria for Recommendations

These recommendations draw on the principles established by the San Francisco Planning Department's second and third policy objectives as laid out by the City's general plan:

"That existing housing and neighborhood character be conserved and protected in order to preserve the cultural and economic diversity of our neighborhoods;

That the City's supply of affordable housing be preserved and enhanced"

In addition, this report advocates for regulations that allow residents to engage in short term rentals according to their individual preferences up until the point that their use of short term rentals conflicts with these two policy objectives.

1. **Increase the current cap to 120 days for any combination of hosted and unhosted STRs;**
2. **Remove the restriction on rent controlled tenants making more revenue than they pay in monthly rent;**
3. **In order to make the law enforceable, institute either a requirement for short term rental hosting platforms to regularly provide non-anonymized data and/or give an enforcement agency the ability to fine hosting platforms for listing illegal short term rentals.**

Rationale: The current cap of 90 days is unnecessarily restrictive. This report shows that the overwhelming number of short term rental units currently rent their listing for far fewer than 90 days. There are also hosts who exceed the 90 day cap and appear to generate a substantial amount of revenue. The relevant policy question is whether changing the cap would alter the incentives of hosts in such a way that induces the conversion of more long term units to STRs. Raising the cap to 120 days

under the current enforcement framework or a future framework that is able to effectively regulate the occupancy rate of STRs will not induce more conversions for the following reasons:

1. Very few landlords can generate more revenue from a STR than from a long term tenant at either 90 or 120 days. If a landlord is seeking to maximize profit then approximately the same very small number of landlords will convert their units to STR under both 90 and 120 caps. Since no more housing will be lost, the cap should be raised to allow residents the freedom to rent their STRs for between 90 and 120 days if they so choose.
2. All units appear to be profitable as short term rentals at any cap above 50 days. Since operating costs relative to potential STR income are sufficiently low, this report estimates that nearly all apartments that become vacant could be profitable as a STR for fewer days than the current 90 day cap. In this sense, raising the cap from 90 to 120 days does not alter the decision making of a landlord whose goal was to avoid having a long term tenant and instead rent out to a short term tenant. If the policy goal was to protect all rental housing from conversion to STRs at any cost, then the cap should be set to well below 20 days. However, this cap would effectively eliminate short term rentals which is not the policy objective of the Board of Supervisors, the Planning Department or the Mayor.
3. Any enforcement regime will be unable to differentiate between hosted and unhosted rentals. There is no conceivable way that the Planning Department or another city agency will be able to tell whether or not a host is present during a rental. So, it is necessary to set a cap that applies equally to hosted and unhosted rentals.

Rationale: the current restriction on rent controlled tenants generating more income than they pay in monthly rent will most likely not preserve any long term housing and is an inequitable solution. It is true that master tenants in rent controlled apartments might be able to pay their rent entirely through income generated by a STR. However, this policy should be removed for the following reasons:

1. It appears impossible to enforce this provision. Auditing the income and rental statements of all short term rentals to identify scofflaws is infeasible.
2. The evidence presented in this report suggests that there is no reason to believe that rent controlled tenants would rent their extra rooms to long term tenants even if this provision could be enforced. Rent controlled tenants often pay far below current market rates and the economics literature demonstrates that they are not mostly very low income tenants that would need the income from a long term roommate.
3. Allowing rent controlled tenants to profit from STR is not unfair. The landlord does not gain or lose anything more from their tenant profiting than if STRs didn't exist. Instead, restricting rent controlled tenants reduces the number of tourists coming to the city who then generate more economic activity. It also produces an inequitable situation where the more affluent rent controlled tenants are still easily able to afford their living costs. At the same time, low income rent controlled tenants will struggle with their living expenses when they could have benefited from the revenue generated by STRs at little cost to society.

Rationale: the current law is unenforceable without giving regulating agencies additional powers. The enforcing agency should be able to require short term rental hosting platforms to regularly provide non-anonymized data and/or to be able to fine hosting platforms for listing illegal short term rentals. This requirement is essential because:

1. There is currently no mechanism to identify how many days any one listing is actually booked per year, no way to identify the address of online listings, and there doesn't ever appear to be a means to enforce the permanent residency requirement.
2. If the City is unable to enforce the regulations, current trends of demand and supply for STRs and the maturation of the STR market suggest that more long term housing will be lost to STRs.

APPENDIX

DATA SOURCES

This report relies on data from a number of sources.

1. A fact sheet provided by Airbnb in 2012 and included in the SF Planning Department's public record on STRs;
2. A consulting report by Rosen Consulting Group who had access to Airbnb data for 2012 but offer no transparency into their methodology. The website 'Journalist's Resource' described this study as an internal Airbnb report[47];
3. An economic impact analysis by HR&A associates for Airbnb that was reported on but not released[48] to the public;[49]
4. Data scraped and mapped in August 2014 by an independent journalist[50] (cited as '8/14 Scrape');
5. A news story by Carolyn Said in the San Francisco Chronical relying on data scrapped from the Airbnb website on May 19, 2014, by the data mining company Connotate[51] (cited as SFC);
6. Data scraped and in December 2014 by an independent journalist[52] and provided to author (cited as '12/14 Scrape');
7. Data scraped on 02/09/15 by an independent journalist[53] and provided to author (cited as '2/15 Scrape').
8. A data summary brief, 'San Francisco: Visitor Industry Economic Impact Summary, 2014' by the San Francisco Travel Association provided to the author (cited as 'SFTA').
9. A database of apartment listings from Craigslist was provided by the San Francisco Planning Department to the author and included data for all of 2014. The data was put through an extensive process to remove duplicates which led to a final total of 8,553 observations.

How reliable is this information?

[47] Penn, Joanna and John Wihbey (2015, January 29th). *Uber, Airbnb and consequences of the sharing economy: Research roundup*. Retrieved from http://journalistsresource.org/studies/economics/business/airbnb-lyft-uber-bike-share-sharing-economy-research-roundup

[48] Airbnb contracted HR&A Advisors to create this report. The author contacted HR&A on 3/18/15 for a copy of the report and was told that the report could not be released since it is Airbnb's proprietary information.

[49] Geron, T. *Airbnb had $56 Million Impact on San Francisco: Study.* Retrieved from http://www.forbes.com/sites/tomiogeron/2012/11/09/study-airbnb-had-56-million-impact-on-san-francisco/

[50] Data collected and published by Tom Slee. Retrieved from https://www.google.com/fusiontables/DataSource?docid=1WvonuxK6oy6c6gi7iIvLDIaJtcyHXbx8t0KKGh1p#map:id=3 in February 2015.

[51] Said, C. Window into Airbnb's hidden impact on S.F. *San Francisco Chronical*. Retrieved from http://www.sfchronicle.com/business/item/Window-into-Airbnb-s-hidden-impact-on-S-F-30110.php

[52] Data collected by: Murray Cox of http://insideairbnb.com/ (personal communication with staff in March 2015).

[53] Data collected by: Guss Dolan (http://darkanddifficult.com/) & Anti-Eviction Mapping Project (http://www.antievictionmappingproject.net/) (personal communication with staff in March 2015)

Overall, this data provides a reliable description of the general characteristics and size of the Airbnb market in San Francisco but cannot provide exact figures due to unverified methodologies and imperfections in the data scraping process. The consulting reports by HR&A and the Rosen Consulting Group provide no methodology nor means of verification. It is impossible to tell whether or not their conclusions are biased or interpreted objectively. Data collected from webscrapes may omit some listings or may over-count duplicated listings and so the resulting statistics are inexact. These limitations in the data reinforce the need to corroborate each source against the others.

BACKGROUND INFORMATION ON SHORT TERM RENTALS

The STR market comprises consumers ("guests") renting entire apartments, private rooms, or access to a shared room from property owners or lease holders ("hosts"). Online hosting platforms such as Airbnb facilitate the connections between hosts and guests and earn a fee from both parties for each booking (i.e. the fee per booking model). Others hosting platforms such as Homeaway and VRBO also facilitate the connection between guest and, in addition to the fee per booking model, offer hosts a subscription service for advertising their rentals (i.e. the fee per listing model). Still other hosting platforms such as Craigslist do not generate revenue from either hosts or guests. Hosts and guests are encouraged by hosting platforms to provide reviews of each other. Most municipalities define short term rentals as lasting fewer than thirty days and prohibit turning residences into fully commercial units. STRs may provide a close substitute to hotel rooms or may provide a new type of lodging product by providing additional amenities such as full kitchens, easy access to different neighborhoods, and a more local and authentic experience of an area.

In many ways, short term rentals represent a hybrid between a hotel, a vacation rental and a subleased apartment. From the consumer perspective, short term rentals often resemble a vacation rental where the consumer pays for the use of a home for a specified duration of time. In some cases the guests may be sharing the space with the hosts in which case the experience more closely resembles Couchsurfing, an earlier service that matched travelers with hosts who were willing to share their homes for free. In other cases, guests and hosts barely interact during a short stay that more closely resembles a hotel stay.

Short term rentals also resemble short term subleases. From a supplier's perspective, the short term rental business resembles repeated short term subleases. Suppliers provide guests with sleeping quarters and access to a bathroom and sometimes other amenities. They must pay upkeep costs in between tenants for cleaning and maintenance work. In addition, they are responsible for property and/or income taxes and bear the costs of damages associated with tenant negligence. Suppliers also face some of the same risks as traditional sub-lessors in the form of bad tenants who are difficult to evict.

The growth of associated services and the maturation of the STR market may encourage more commercialization and increase the ability of causal users to engage in STRs. Hosts can increasingly rely

on API integration to seamlessly post listings across multiple short term rental platforms. Full service listing management services take all of the effort and work out of hosting a STR.[54] Still other services help hosts maximize their revenue through real time pricing algorithms.[55]

Many proponents of STR claim that the nature of online reviews will self-regulate the market and ensure high quality experiences for guests. The available evidence suggests that online marketplaces do not fully self-regulate. Online marketplaces that rely on profiles and digital reputations may facilitate racial discrimination. A study of Airbnb in New York City found that non-black hosts charge 12% more for rentals controlling for all information visible on the website.[56] Airbnb's rating system also fails to differentiate listings through their reputation based system since nearly 95% of ratings are 4.5 or 5 stars (Airbnb's rating system has a maximum of 5 stars). Moreover, it is unclear what these ratings really mean. There is only a very weak correlation between the ratings of properties listed on both Airbnb and TripAdvisor.[57] In general, users of reputation based marketplaces seek out reciprocal positive reviews. In this way, these reputations are probably upwardly biased.[5859] More recently, Airbnb has acknowledged potential problems of bias and has instituted new structures to encourage more honest reporting.[60]

BRIEF DISCUSSION OF OTHER THREATS OF SHORT TERM RENTALS

INCREASED TENANT EVICTIONS

Many tenants may want to offer short term rentals in their unit without fully understanding the risks involved. Leases may have clauses in them making subleasing a violation of the lease or specifically prohibiting short term rentals. Tenants hosting short term tenants would be opening themselves up to an eviction for cause without fully understanding the risks. Other leases may not have specific language about subleasing or short term rentals but might have language about illegal uses of the unit. Most hosts in San Francisco are currently out of compliance with current short term rental regulations and so would also be opening themselves up to being evicted.

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[54] Examples include Pillow and Guesthop.

[55] Examples include BeyondPricing and Everbooked

[56] Edelman, Benjamin G. and Luca, Michael, Digital Discrimination: The Case of Airbnb.com (January 10, 2014). Harvard Business School NOM Unit Working Paper No. 14-054. Available at SSRN: http://ssrn.com/abstract=2377353 or http://hbswk.hbs.edu/item/7429.html

[57] Zervas, Georgios and Proserpio, Davide and Byers, John, A First Look at Online Reputation on Airbnb, Where Every Stay is Above Average (January 28, 2015). Available at SSRN: http://ssrn.com/abstract=2554500

[58] Overgoor, J., Wulczyn, E. & Potts, C. (2012). Trust Propagation with Mixed-Effects Models. In J. G. Breslin, N. B. Ellison, J. G. Shanahan & Z. Tufekci (eds.), ICWSM, : The AAAI Press. Retrieved from http://web.stanford.edu/~cgpotts/papers/OvergoorWulczynPotts.pdf

[60] McGarry, C. (2014, July 11). Airbnb revamps reviews to encourage more honesty. *TechHive.* Retrieved from http://www.techhive.com/article/2452750/airbnb-revamps-reviews-to-encourage-more-honesty.html

The evidence is difficult to come by, but it there appears to be a rise in evictions for breach of lease that correlates to the rise of short term rentals in San Francisco. However, there is also a general increase in eviction pressure due to rising rents that incentivize landlords to put pressure on long tenured tenants in rent controlled apartments. It is inappropriate to claim from this data that STRs are responsible for the increase in evictions, but the correlation and anecdotal evidence do buttress the claims that the phenomenon is happening.[61]

	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015[62]
Breach of Rental Agreement	399	442	561	468	607	738
Ilegal use of Unit	37	20	26	41	42	91

INCREASED LEGAL LIABILITIES

Insurance companies consider short term rentals as a form of commercial use in the same way as the operation of a bed and breakfast.[63] Renters and homeowner's insurance will not cover damages incurred through the use of a short term rental. Airbnb offers hosts supplementary insurance which increases the protections for hosts but only if their primary insurer accepts their claim. Owners and residents may be increasing their potential liability for damages to their units or from lawsuits by short term tenants if they only have insurance meant for strictly residential use. This could be especially true in San Francisco where the prohibition of accessory dwelling units (ADU, i.e. 'in-law unit') and restrictive zoning codes create illegal housing units that have not been inspected to be up to code.

Landlord-tenant conflicts are regulated similarly to traditional leases in some cases and hotels in others. California recognizes STR guests who stay in a rental for more than thirty days to have the same rights as long term tenants in some situations.[64] In this way, suppliers face many of the same risks of sublessors but appear to not take the same legal precautions. Some hosts ask guests to sign a contract or rental agreement as a condition of rental.[65] However, it appears that the majority of short term rentals do not require any written or signed terms.[66] The lack of clearly delineated rights and responsibilities could

[61] Dickey, M. *some Airbnb Hosts in San Francisco Are At Risk Of Eviction.* Retrieved from http://www.businessinsider.com/airbnb-hosts-san-francisco-risk-eviction-2014-4
[62] All data Retrieved from Sf Rent board at http://www.sfrb.org/index.aspx?page=46
[63] Interviews of an insurance representation from a national insurance company as well as an interview with a lawyer specializing in San Francisco rental housing.
[64] California Department of Consumer Affairs. *General Information about Landlords and Tenants.* Retrieved from http://www.dca.ca.gov/publications/landlordbook/whois.shtml
[65] Airbnb. *Can Hosts Ask Guests to Sign a Contract.* Retrieved from https://www.airbnb.com/support/article/465?topic=223
[66] Scan by author of 50 listings on Airbnb and Homeaway on 3/30/15 found only a single requirement for a written contract.

make future litigations more difficult in cases of conflict.[67] Tenants and landlords in California face the prospect of having to go to the courts to formally evict any guests who refuse to leave after staying for more than thirty days.[68]

Hosts also may be required to comply with the American's with Disabilities act depending on the circumstances although this area of law remains unsettled. Owner-occupied residences are exempt from ADA requirements but units rented out full time for STRs may have to be ADA compliant.[69]

Some legal analysts believe that although it is unclear whether hosts are covered by the ADA, it is only a matter of time before ADA lawsuits begin.[70] Other analysts claim the short term rentals will most likely be covered by the ADA and similar state laws because of their similarity to timeshares which the DOJ has recently found to be "places of lodging."[71]

In addition, the Fair Housing Act applies to STRs and it is illegal to discriminate against a potential renter based on race, religion, national origin, gender, familial status or disability. Both Federal and California state laws (i.e. the Unruh Act) apply.[72,73,74]

DISRUPTIVE BEHAVIOR OF STR GUESTS

Increased use of short term rentals bring more and more visitors into neighborhoods and into residential buildings. STR guests have fewer incentives to create or maintain good social relations with

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[67] G3MH. *Landlord-Tenant Issues in San Francisco.* Retrieved from http://www.g3mh.com/downloads-2014/8_2014_Landlord_Tenant_Issues.pdf

[68] Bort, J. *Airbnb Host: A Guest Is Squatting In My Condo And I Can't Get Him to Leave*. 2014. Retrieved at http://www.businessinsider.com/airbnb-host-cant-get-squatter-to-leave-2014-7#ixzz38EUXm1xU

[69] Title III-1.300 of the ADA exempts residential dwelling units. However, time shares and vacation homes which are commercial in nature are sometimes covered by the act. The Department of Justice rules stress that "the extent to which the operations resemble those of a hotel, motel or inn" dictate whether or not a vacation home or time-share should be ADA compliant. Airbnb advises its hosts that most are not 'a place of public accommodation' and so are exempt from the ADA. However, it warns that the ADA may apply to hosts who offer more than five rooms.

[70] Wilson, M. (2014, August 14). Could Housing-Sharing Open the Door for ADA Litigation? [Web log post]. Retrieved from http://blogs.findlaw.com/strategist/2014/08/could-house-sharing-open-the-door-for-ada-litigation.html

[71] Gladstone, M. B. (2014, October 15). *What the Final New Airbnb Legislation Means for You, Your Tenants and Your Liabilities*. Retrieved from http://www.hansonbridgett.com/Publications/articles/2014-10-landuse-term-rentals.aspx

[72] Eichner, M. (2013, November 28). *Are temporary rentals covered by fair housing laws?* Los Angeles Times. Retrieved from http://articles.latimes.com/2013/nov/28/business/la-fi-rentwatch-20131201

[73] Fishman, S. *How to Screen Renters on Airbnb, VRBO, and Other Short-Term Hosting Sites*. Retrieved from http://www.nolo.com/legal-encyclopedia/how-screen-renters-airbnb-vrbo-other-short-term-hosting-sites.html

[74] *Unruh Civil Rights* Act. Retrieved from http://www.dfeh.ca.gov/Publications_Unruh.htm

other residents and may be more disruptive. Bachelor parties or visitors with a late night schedules would increase the noise and disturbances for the immediate neighbors. In addition, giving STR guests access to buildings raises safety concerns for all residents if keys are copied or lost, security gates are left open or criminals are given access to the building.

LOSS OF COMMUNITY

Increased concentration of short term rentals in neighborhoods removes long term residents who build functioning health communities. Taken to an extreme, this would create a hallowing out of neighborhoods as the percentage of long term residents drops below the density required to support cultural or community institutions.

SUMMARY OF PROBLEMS STRS POSE TO SF RENTAL HOUSING

The following chart summarizes this report's analysis of the current impact of STRs in San Francisco:

	Finding	Qualification/Notes
Overall Impact	5000-7000 total STR listings which represent a substantial fraction of vacant rental units.	Unclear the number of duplications across hosting platforms and the number of unique properties with a STR.
	High concentration of Airbnb listings in central and northern neighborhoods	
	Top ten percent of Airbnb listings are estimated to exceed 100 days of occupancy per year.	This is a conservative estimate but it impossible to determine an exact figure.
Conversion to STR Hotels	Estimated 500 commercial Airbnb hotels	Conservatively estimates this figure by only including STRs listed for more than six months, on Airbnb, with an occupancy rate above 50%. This is an approximation that assumes that each stay is for the average duration of 5.1 nights.
	High concentration of 'Airbnb hotels' in central and northern neighborhoods	
Withholding of rental units from market	The current estimated average revenue for Airbnb's in apartments exceeds the average operating costs for	

	apartments.	
Overconsumption of Housing (loss of roommates)	Current Airbnb 'private room' listings do not generate as much revenue as the median per bedroom rent in SF but do generate more than the rent of approximately 30% of rent controlled apartments (25% of all apartments)	

The following chart summarizes this report's analysis of the incentives involved with STRs and how STRs could impact rental housing in San Francisco in the future:

	Finding	Qualifications/Notes
Overall Projections	Increase in demand for STRs due to constrained hotel supply which substitutes for STRs.	Unclear how much of the increased demand for hotels will translate into demand for STR and how much will extend to hotels in areas outside of San Francisco.
	Increase in demand for STRs due to increased acceptance of STRs among business travelers.	
	Continuing to serve 'extended STR' consumers who have no other formal options.	Extended STR consumers are those who want to stay in San Francisco for between a week and a month.
Conversion to STR Hotels	Median of 213 days to make more money from a STR than a LTR	This does not indicate that half of apartments will convert to STR hotels if the cap is raised to 213. However, it points to the overall profitability of STRs that are operated like hotels
	Very few apartments more profitable above 120 days	There does not appear to be an incentive to convert a long term rental into a STR if there is an enforced cap of 120 days.
Withholding of rental units from market	Apartments in San Francisco need to be rented as a STR on average for 24 days to generate as much revenue as the long term operating costs of the unit.	This revenue figure does not include the costs of maintaining a STR which is roughly estimated at 18% of revenue.
Overconsumption of Housing (loss of roommates)	Uncertainty around whether rent controlled tenants would actually rent spare bedrooms to long term roommates precludes	

	projections.	

METHODOLOGY FOR BREAK EVEN POINT ANALYSIS

This section explains the methodology for determining the break even occupancy rate between short term rentals and long term rentals in San Francisco. This analysis seeks to answer the question: how many days of the year would a short term rental need to be rented to be as profitable as a long term rental? This analysis uses the data set of Airbnb units scraped in December 2014 as it appears to be the most complete and accurate data available.

The following variables are included in this calculation:

P_{LT} = Annualized rent of an apartment rented as a long term rental. This is the actual monthly price listed on craigslist for an apartment in San Francisco multiplied by 12. Craigslist units with a price per bedroom below $700 are removed since they all appear to be advertising for roommates instead of for entire units.

P_{ST} = Estimated annualized price of an apartment rented at 100% occupancy as a short term rental on Airbnb. This is a value fitted to the specifics of one of the Craigslist apartments. A number of regressions were run to test different functional forms using the number of bedrooms, number of bathrooms and a dummy variable for each of the 38 planning department defined neighborhoods. These regressions were only run on the subset of the Airbnb units that are listed as entire units (as opposed to just private rooms or shared rooms). For Craigslist units that did not list information about a bathroom, the functional form specification is:

$$P_{ST} = \alpha + \beta\, Bedrooms + \beta\, Bedrooms^2 + \boldsymbol{\beta}\, Neighborhood_i + \varepsilon$$

Where α is the intercept, Bedrooms is the number of bedrooms that a short term rental has, Bedrooms squared is the squared number of bedrooms in a short term rental, $\boldsymbol{\beta}\, Neighborhood_i$ represents a set of dummy variables for all but one of the neighborhoods defined by the planning department and ε is the error term. For craigslist units whose listings included information about the number of bathrooms, the functional form is:

$$P_{ST} = \alpha + \beta\, Bedrooms + \beta\, Bedrooms^2 + \beta\, Bathrooms + \boldsymbol{\beta}\, Neighborhood_i + \varepsilon$$

The coefficients from these regressions are used to estimate what each craigslist apartment would be able to charge as a short term rental. This gives an estimated nightly short term rental rate which I then multiply by 365 to create an estimated annualized short term revenue.

C_{ST} = annual cost to running a short term rental over and above normal maintenance costs. This includes fees, cleaning and maintenance costs and hotel taxes. Two of the higher profile providers of short term

rental management and cleaning services charges 15% of gross revenue.[75][76] This service provides cleaning services, pre-reservation home preparation, managing guest interactions, price optimization, screening potential guests, and emergency support. In addition, Airbnb charges a 3% fee to the landlord for the processing the booking. This leads to a total short term operating cost of 18%. However, none of these costs are included in the normal maintenance of an apartment a landlord must pay each year which include more major repairs, building management, depreciation, and property taxes among others.

M = Annual long term maintenance costs for being a landlord. The 2013 Survey of Operating Income & Expenses In Rental Apartment Communities found that the average annual operating expenditure for multifamily units in the San Francisco-Oakland-Freemont MSA is $7.68 per square foot.[77] This figure applies to both long term and short term rentals and so drops out from the model. It is possible that it does not apply evenly to both long term and short term rentals but this analysis assumes that they are the same.

Model

The research question is concerned about the expected income a landlord stands to gain or lose by choosing to withhold her unit from the long term market and instead rent it out as a short term rental. The outcome of interest is the breakeven occupancy rate that leads to equivalent short term rental income and long term rental income for the next year:

$$[\, P_{ST} \times (1 - C_{ST}) \times O \,] - M = P_{LT} - M$$

Simplifying and rearranging terms leads to our model:

$$O = \frac{P_{LT}}{P_{ST} \times (1 - C_{ST})}$$

The resulting values are used to evaluate the occupancy rates based on the fitted model. However, in this equation, P_{LT} and C_{ST} are known values but P_{ST} is a constructed variable subject to uncertainty. The regression model explains approximately half of the variation in short term rental prices. This uncertainty is included in the model through a simulation of the average one and two bedroom unit listed on Craigslist for five neighborhoods. So, instead of using single values, the simulation analysis incorporates the following distributions:

[75] Retrieved from https://www.pillowhomes.com/
[76] Retrieved from http://guesthop.com/
[77] Lee, C. *2013 Survey of Operating Income & Expenses In Rental Apartment Communities*. National Apartment Association. Retrieved from http://www.naahq.org/sites/default/files/naa-documents/income-expenses-survey/2013-Income-Expenses-Summary.pdf

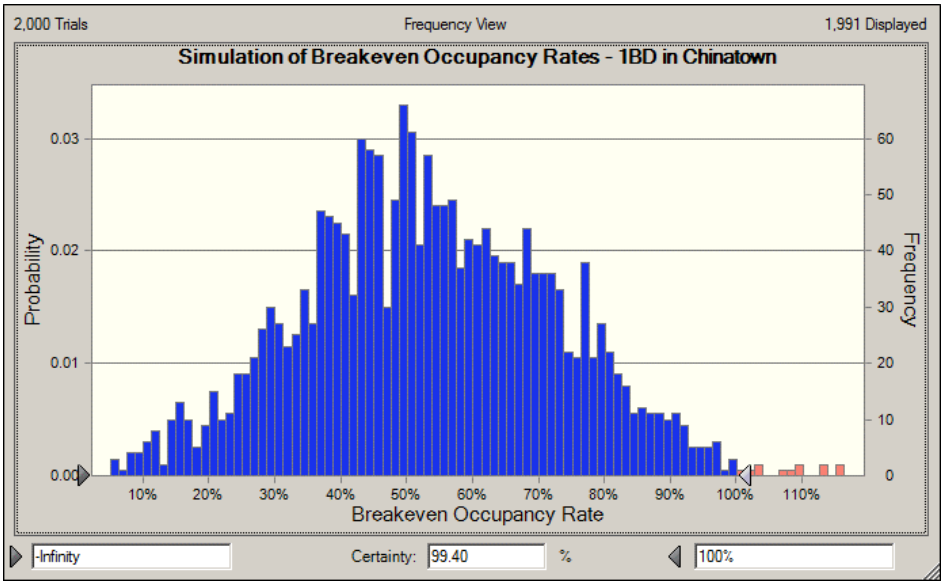
P_{LT} = normally distributed with a mean equal to the average rent and with a standard deviation from the data used to calculate the mean. This is calculated by neighborhood separately for one and two bedroom units.

P_{ST} = the fitted value equal to characteristics of the apartment under consideration in the simulation. This is also assumed to be normally distributed with a standard deviation equal to the standard error of the regression.

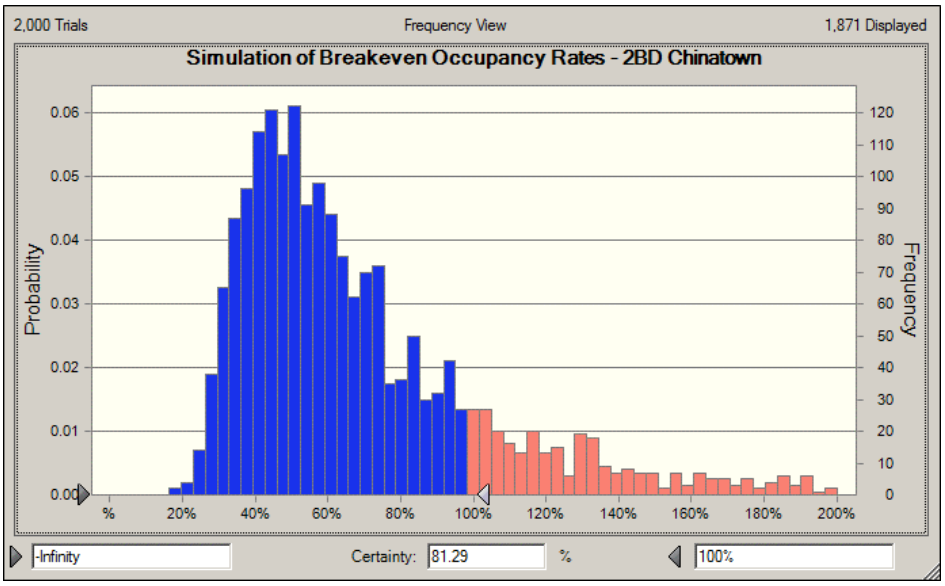
With the same model, two thousand trials were run using those distributions to estimate the breakeven occupancy rate for each typical one and two bedroom unit in five different neighborhoods of interest. The results confirm the general distribution of breakeven occupancy rates. The simulation additionally provides a measure of confidence for predicting whether units are more profitable as a short term unit rather than a long term unit.

This resulting simulations illustrate the certainty with which the model estimates that a particular apartment could be more profitable as a STR than as a long term rental.

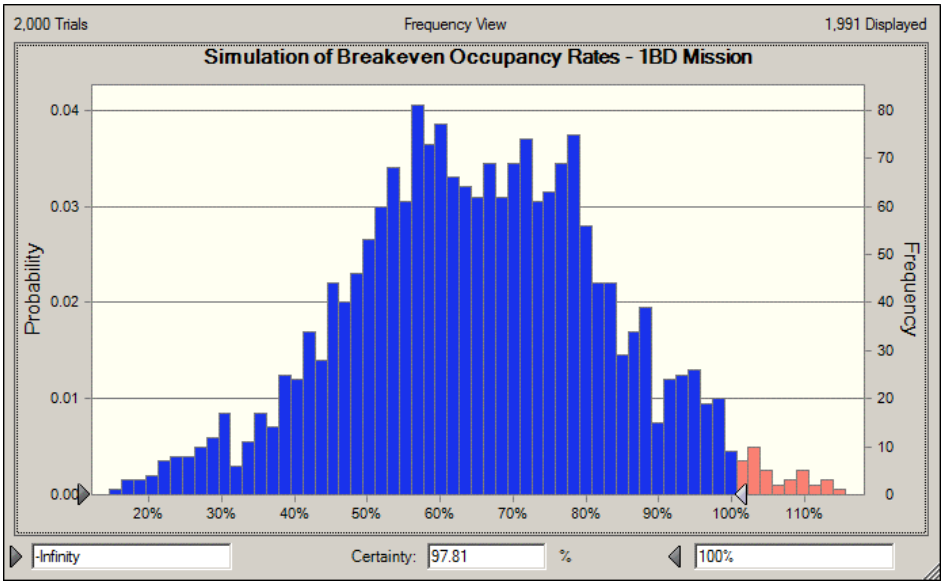
Typical 1 Bedroom Apartment in Chinatown:



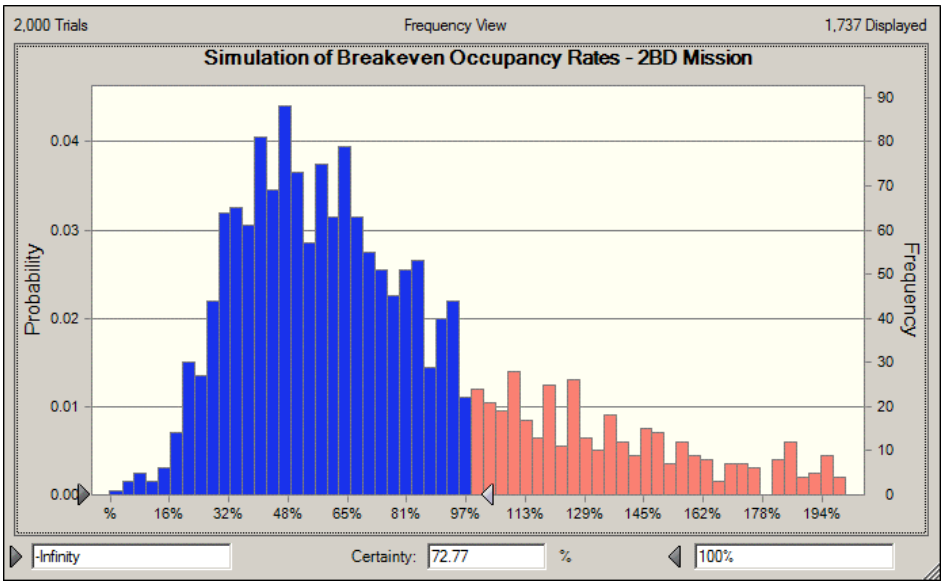
Typical 2 Bedroom Apartment in Chinatown:



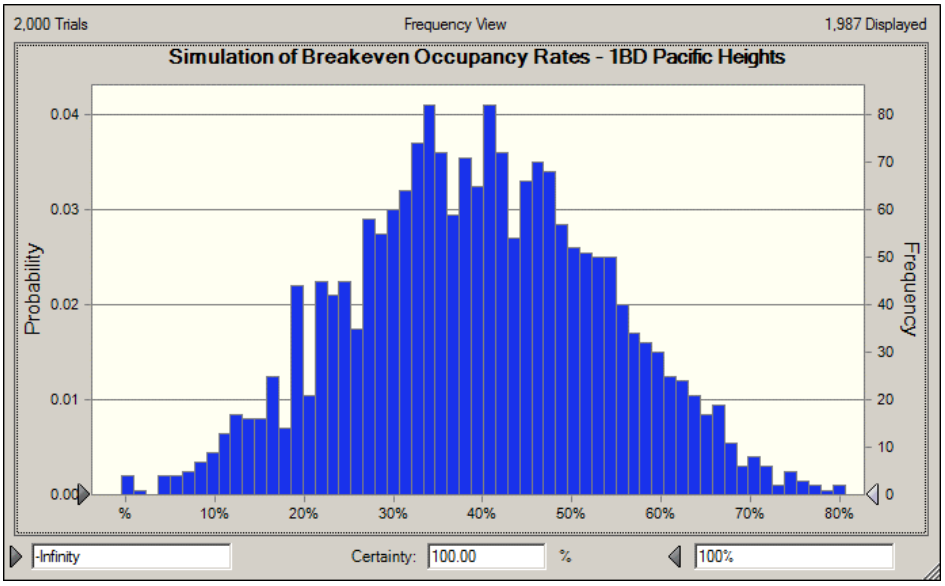
Typical 1 Bedroom Apartment in Mission:



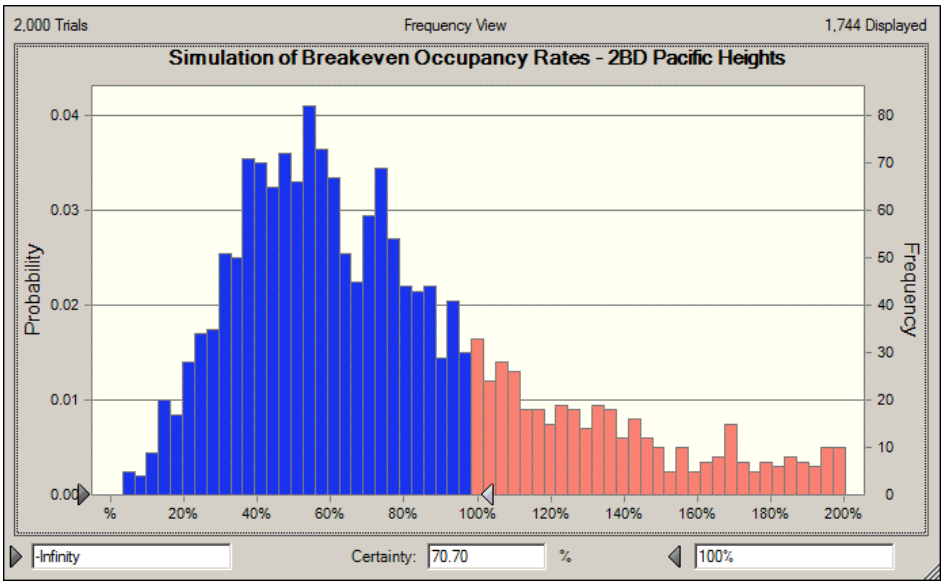
Typical 2 Bedroom Apartment in the Mission:



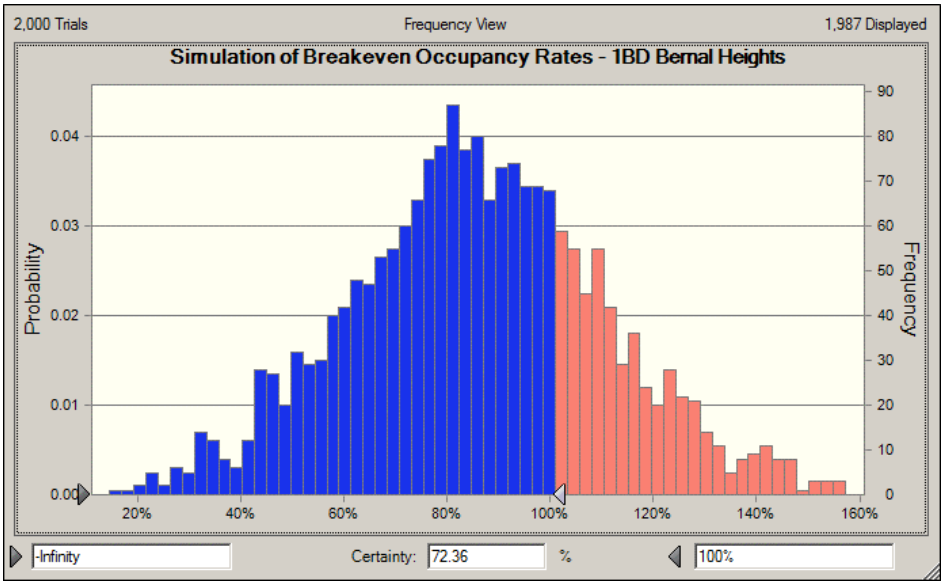
Typical 1 Bedroom Apartment in Pacific Heights:



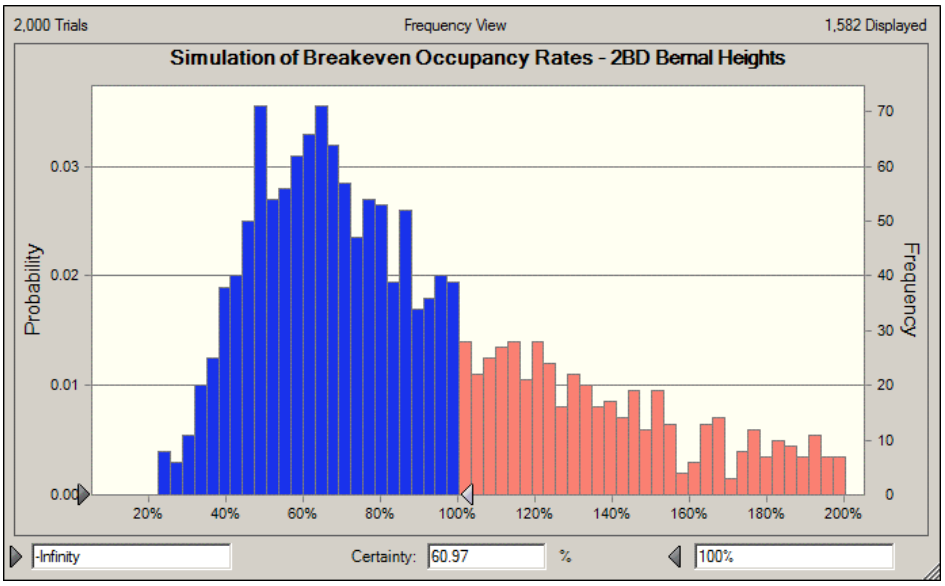
Typical 2 Bedroom Apartment in Pacific Heights:



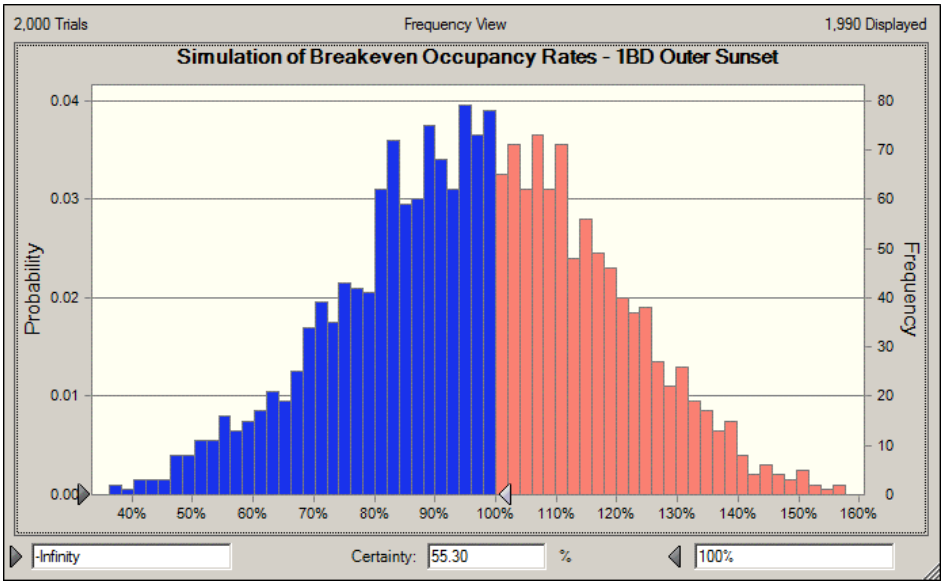
Typical 1 Bedroom Apartment in Bernal Heights:



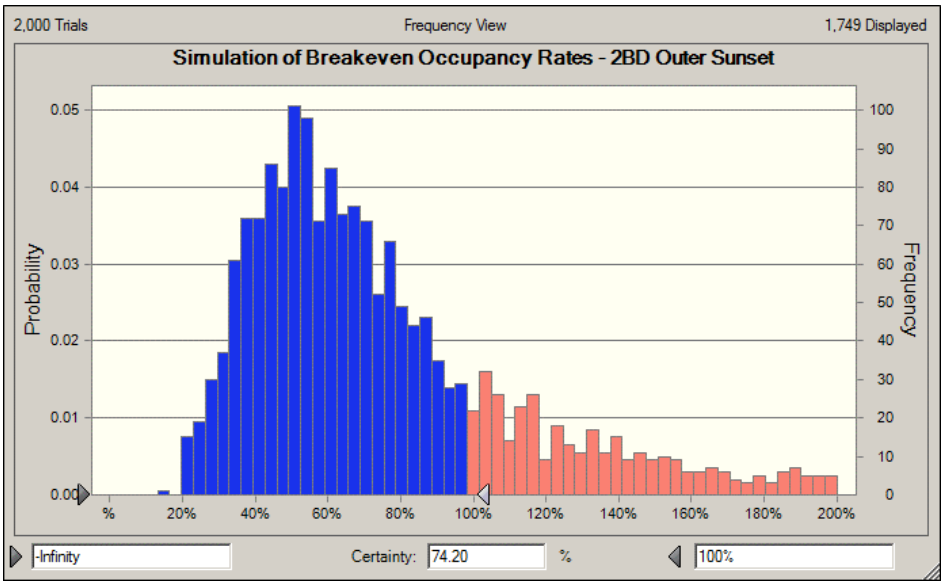
Typical 2 Bedroom Apartment in Bernal Heights:



Typical 1 Bedroom Apartment in the Outer Sunset:



Typical 2 Bedroom Apartment in the Outer Sunset:



METHODOLOGY FOR LANDLORD DECISION WITH DISCOUNTED FUTURE INCOME STREAMS

This simulation builds off of the Break Even Point methodology to incorporate landlords' expectations of future income streams for long term and short term rentals. Surveys of landlords in San Francisco show that 45% of landlords say that rent control makes being a landlord more difficult and 61% say eviction controls have at least some impact on increasing the difficulty of operations. [78] To account for this, this simulations incorporates a rational landlord's accounting of expected losses from rent control when accepting a long term tenant.

Landlord's income streams for long term and short term rentals are simulated separately for the average one bedroom apartment in each of the five neighborhoods with the highest concentration of expected commercial units. These neighborhoods are simulated to test the impact of different caps on unhosted rentals on the expected profitability of short term rental hotels. The current regulatory framework suggests that it is possible to successfully enforce regulations on the number of nights an unhosted rental can be rented. However, other regulations around ensuring that a landlord is the permanent tenant appear to be very difficult to enforce.

The simulation uses several assumptions to model a landlord's decision about expected income streams. The allowable rent control increase in San Francisco is set at 60% of the consumer price index (CPI). [79] For this analysis, I assume that a landlord expects that inflation will continue at the most recently announced annual CPI for the Bay Area of 2.5%. [80] The expected annual allowable increase under rent control is then 1.5%. The landlord will also have an assumption about the growth of market rate rents.

[78] Landlord Survey, page 23

[79] Rent board http://www.sfrb.org/Modules/ShowDocument.aspx?documentid=1939

[80] http://www.bls.gov/regions/west/news-release/ConsumerPriceIndex_SanFrancisco.htm

In January 2015, rents grew by an average of 14.9% year over year.[81] Although this increase is not spread evenly across the city. I will conservatively estimate that for any place in the city a landlord should expect a five percent increase in rents year over year for the next several years.

In summary, this simulation includes the following variables and assumptions:

i = the inflation rate assumed to be the current consumer price index of 2.5%

r_m = the growth rate of market rents, assumed to be 5%

r_{ST} = the growth rate of short term rents. Assumed to be the same as the growth of hotel rates in the San Francisco metropolitan area which has averaged 3.9% from 1988 to 2014. However, the past four years have seen approximately 10% year over year growth in nightly hotel rates and this growth is projected to taper off to between 4% to 8% over the next four years. This analysis assumes that landlords conservatively expect short term rents to grow by 5% over the next ten years.

r_c = the allowable rent increase for a rent controlled unit, assumed to be the most recent value of 1.5%.

R_o = the base market rent charged at the beginning of tenancy (t = 0).

t = number of years

C_{ST} = annual cost to running a short term rental over and above normal maintenance costs. Please see previous appendix section for explanation. Value assumed to be 32% of total short term revenue.

O = occupancy rate of the short term rental hotel. Assumption is varied between 60, 90, 120, 230 and 300 days. 60, 90 and 120 days model the three most commonly suggested caps on unhosted rentals. 230 and 300 days represent that national average hotel occupancy rate and the San Francisco hotel occupancy rate respectively.

The net present value of the income stream for long term rents depends the landlord's expectations of the length of tenure of their long term tenant because of the impact of rent control. The American Community Survey 5 year sample for San Francisco shows that of the 453, 017 renters in San Francisco, 358,096 (79%) lived in the same residence a year ago.[82] The economics literature has established that under rent control the probability of turnover is a conditional on the tenant's length of tenure: people in rent controlled apartments are more likely to stay in their apartment the longer they've been in that

[81] Zillow research: http://www.zillow.com/research/jan-2015-market-report-8951/

[82] Source: U.S. Census Bureau, 2009-2013 5-Year American Community Survey B07013: Geographic Mobility in the past year by tenure for current residence in the United States.

unit.[83] However, for simplicities sake I will assume that the probability of any tenant leaving in any year is 20%.

The simulation predicts whether the rent should reset to market rates or continue to grow by the rate allowed by the rent control board each year for ten years. This income stream is converted to a net present value. The simulation compares that figure against the present discounted value of ten years of short term rental income where the nightly rate tracks the growth of hotel prices. This analysis is run for the five different occupancy rates. This creates five distributions of the expected profit or loss from renting a unit as a short term rental instead of a long term rental. The analysis assumes that rational landlords will choose the higher value.

The final results of the simulation for the five neighborhoods of interest (Fix this map)

Cap		Mission	Castro/Upper Market	Haight Ashbury	Western Addition	Bernal Heights	South of Market
60	Expected Value	-272193	-251236	-243458	-254114	-233842	-267591
	Confidence it's Converting	0	0	0	0	0	0
90	Expected Value	-236864	-210302	-207687	-216399	-206769	-215402
	Confidence it's Converting	0	0	0	0	0	0
120	Expected Value	-201535	-169368	-171916	-178683	-179696	-163212
	Confidence it's Converting	0	0	0	0	0	0
230	Expected Value	-71994	-19277.5	-40756.6	-40392.6	-80427.6	28149.22
	Confidence it's Converting	0	0	0	0	0	32.9
300	Expected Value	10441.04	76234.89	42708.61	47610.5	-17256.8	149924.8
	Confidence	13.6	100	95.7	99	0	100

[83] Ault paper on rent control http://ac.els-cdn.com/S0094119084710096/1-s2.0-S0094119084710096-main.pdf?_tid=6a01ec3a-edd5-11e4-9eeb-00000aab0f6c&acdnat=1430246339_d284a3f425f5a3b384afc08b27e0dda2

	it's Converting						

The table above confirms the earlier conclusion that long term rentals are still more profitable to the rational landlord unless the enforced cap approaches hotel occupancy rates of above 250.

REGRESSION MODEL AND RESULTS FOR PREDICTING VALUES OF AIRBNB PRICES

Short term rents are predicted for rental units listed on craigslist by regressing the available attributes of Airbnb rentals on their nightly price. The full model is:

$$P_{ST} = \alpha + \beta\, Bedrooms + \beta\, Bedrooms^2 + \beta\, Bathrooms + \boldsymbol{\beta}\, Neighborhood_i + \varepsilon$$

Where α is the intercept, Bedrooms is the number of bedrooms that a short term rental has, Bedrooms squared is the squared number of bedrooms in a short term rental, $\boldsymbol{\beta}\, Neighborhood_i$ represents a set of dummy variables for all but one of the neighborhoods defined by the planning department and ε is the error term. For units on Craigslist whose listings that did not include information about the number of bathrooms, the functional form is:

$$P_{ST} = \alpha + \beta\, Bedrooms + \beta\, Bedrooms^2 + \boldsymbol{\beta}\, Neighborhood_i + \varepsilon$$

These regressions gave the following predictive values:

VARIABLES	(1) price	(2) price
Bedrooms	30.54***	51.08***
	(8.938)	(13.86)
Bedrooms Squared	8.457***	11.41***
	(2.681)	(3.820)
Bathrooms	90.19***	
	(8.645)	
Bayview	-39.76**	-47.68**
	(19.84)	(19.88)
Bernal Heights	-46.76***	-49.46***
	(7.125)	(7.140)
Castro/Upper Market	13.77*	14.96*
	(7.191)	(7.884)
Chinatown	24.94**	27.89**
	(10.37)	(11.73)
Crocker Amazon	-95.99***	-98.32***

	(32.17)	(31.40)
Diamond Heights	-46.71	-15.39
	(37.12)	(29.41)
Downtown/ Civic Center	4.957	11.55
	(7.051)	(7.641)
Excelsior	-80.63***	-92.95***
	(15.45)	(13.87)
Financial District	44.06***	48.17***
	(12.86)	(14.87)
Glen Park	-37.22**	-35.09***
	(14.56)	(13.35)
Golden Gate Park	-22.80*	-35.67**
	(12.82)	(16.33)
Haight Ashbury	-0.866	-9.038
	(8.191)	(8.866)
Inner Richmond	-32.92***	-35.90***
	(8.936)	(9.027)
Inner Sunset	-44.50***	-44.87***
	(8.614)	(8.066)
Lakeshore	-33.27	-35.59
	(27.88)	(24.64)
Marina	58.52***	57.99***
	(10.96)	(11.87)
Mission	-6.772	-11.09
	(6.961)	(7.323)
Nob Hill	49.38***	47.77***
	(9.519)	(10.46)
Noe Valley	9.124	9.359
	(10.41)	(10.82)
North Beach	58.47***	58.28***
	(14.57)	(16.14)
Ocean View	-65.71***	-66.81***
	(19.26)	(18.88)
Outer Mission	-76.76***	-79.44***

	(13.91)	(13.25)
Outer Richmond	-54.92***	-59.24***
	(11.18)	(10.26)
Outer Sunset	-56.46***	-65.12***
	(13.24)	(12.96)
Pacific Heights	85.06***	98.63***
	(24.24)	(26.25)
Parkside	-46.29**	-51.60**
	(20.12)	(21.25)
Potrero Hill	11.16	19.06
	(20.32)	(20.39)
Presidio	4.979	6.567
	(25.75)	(22.68)
Presidio Heights	38.65	41.98
	(26.10)	(30.68)
Russian Hill	62.68***	56.06***
	(13.26)	(13.62)
Seacliff	-63.78***	-80.13***
	(21.40)	(30.27)
South of Market	55.13***	67.26***
	(11.24)	(11.71)
Treasure Island/YBI	-27.66	-25.42
	(90.16)	(83.26)
Twin Peaks	19.80	20.90
	(23.40)	(26.71)
Visitacion Valley	-100.7***	-92.56***
	(29.63)	(22.87)
West of Twin Peaks	-80.74***	-61.91***
	(20.48)	(19.87)
Western Addition	-	-
Constant	39.83***	112.8***
	(12.89)	(10.57)

Observations	3,212	3,212
R-squared	0.488	0.434

Robust standard errors in parentheses

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