

Lessons Learned: How to Analyze Short-term Rentals in Your City

This is the first in a series of articles we're writing on the lessons we've learned about how local governments can work with and adapt to emerging technologies within their communities. Over the past two years we've heard from a number of cities trying to answer complex questions about everything from ride-sharing to data-sharing. As these emerging technologies and services continue to evolve and integrate into our daily lives and cities, we hope to share what we've learned so far.

Short-term Rentals Emerge

The first topic is short-term rentals, essentially peer-to-peer hotel accommodations run in what is often a host's place of residence. Some cities have had long-standing vacation rental ordinances that fit nicely with this mode of short-term rentals, but many cities don't. In fact, most cities tend to relegate rentals of less than 30 days to official hotels, which are often taxed and monitored for health and safety standards. Short-term rentals have emerged as a popular consumer choice, often competing against hotels on price, but also offer unique accommodations and stays in neighborhoods where hotels aren't zoned or permitted. As a proof to short-term rentals' popularity, the leading platform, Airbnb, now offers access to more room rentals than any international hotel chain and is valued at several billion more than any hotel company.

San Francisco 2015

The issue of how to regulate short-term rentals emerged early in San Francisco and came to a head in 2015 when the Board of Supervisors was debating between several competing proposals to regulate the new industry. There were concerns that the rentals were subverting an already expensive housing market, giving rise to more evictions, violating zoning laws, and upending the quality of life in residential neighborhoods.

Challenge - How to Analyze What You Can Not See

Our first challenge to analyzing this issue was locating where the rentals are, how often they are rented and how much the hosts might be earning. If these were traditional hotels we'd know exactly where they were - by the signs on the side of the building or their business registration. However, short-term rentals happen behind the closed doors of residences, without signs on their building, and none were reporting their activities to the City at the time.

Many of the rental platforms go to great lengths to obscure the location of their rentals to avoid this type of scrutiny. It didn't help that none of the short-term rental platforms would respond to our requests for information (notably, they did meet with us in a subsequent study we conducted in 2016).

Get Creative

This led us to our lesson learned - to answer these questions you may need to get creative. You can actually estimate the location, rental frequency, host revenue, and platform revenue with some accuracy, even if the platforms refuse to work with you.

Use Public Facing Data

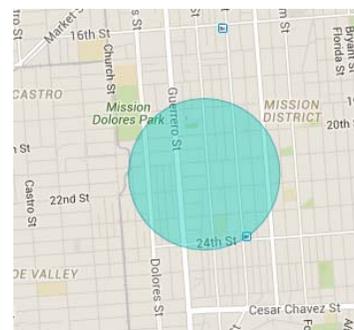
Our analysis focused on Airbnb because it was and still is the market leader and represents the bulk of rental activity in San Francisco. They actually have a surprising amount of public facing data available for each listing. You still need to piece together several clues to make an estimate, but the key information to do this is there and visible to the public. If you're looking at a very small community it might be feasible to manually visit each listing and record the information. However, there are over 6,000 listings in San Francisco and manually visiting each listing isn't feasible. Instead, we turned to the work published by several data scientists who scraped the public facing data on the platforms' sites. One in particular from [InsideAirbnb.com](https://www.insideairbnb.com) stood out as the most comprehensive and reliable dataset for San Francisco.

Model What You Don't Know

How do you model what you can't see? You collect all of the data you can see publicly and build a model to estimate what's happening. Here's how we did it:

Location

- 1 The publicly available data shows a rental's location within 0.6 miles, so we knew approximately where they were located and which neighborhoods.



Reviews

- 2 Their website also chronicled all of the reviews a listing received, including the

129 Reviews ★★★★★

dates. So we knew approximately when a listing started renting, the date of the most recent reviewed rental, and the frequency in-between.

Review Ratio

3 In 2012, [Brian Chesky, the CEO and Founder of Airbnb stated that](#) 72% of customers leave reviews. This is the first key to modeling how often the rentals were occurring. This rate implies that on average each review represents 1.39 rentals because 28% of customers don't leave reviews.

72%

Number of Nights

4 The second key is the average number of nights stayed. This came from a survey by the San Francisco Travel Association that found guests stayed at peer-to-peer lodging a median rate of 5.1 nights in 2014. The trick is to multiply the number of nights stayed per listing with the average number of rentals using the reviews.

$$\text{Reviews} \times 1.39\% \times 5.1 \text{ Nights} = \text{Estimated nights rented}$$

Annualize

5 Next, you can break this down into annual segments and estimate the number of nights rented per year.



Apply Rental Rates

6 Lastly, you can apply the rate that they publish to those nights. A word of caution, however: rental rates can fluctuate throughout the year and it is difficult to know for sure without multiple years of data. Just remember this is only an estimate.



Example Calculation

For example, a listing in the Mission District of San Francisco had its first review posted in April 2013, and its most recent review posted as of April 2016, with 90 reviews total, or roughly 30 reviews per year. If customers stayed 5.1 nights on average this means the unit is rented on Airbnb an estimated 153 nights per year. If the host charges an average \$175 per night (a low price in San Francisco!) then the host is earning an estimated \$26,775 per year, or \$2,231 per month.

Put It All Together

Our method arrives at each listing's calculation, but the final step is to put it all together. We mapped our modeled results across the city, sorted it by neighborhood, rental frequency, and types of hosts. From here you can begin your analysis and ask the tough questions about regulations, zoning and enforcement.

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Harvey M. Rose Associates is a public sector management consulting firm. We provide government analytics services to cities, counties, states and other local government agencies. What exactly is government analytics? It means helping government leaders understand, measure and improve their organizations with evidence-based solutions. We conduct performance audits, management reviews, policy analysis, and a range of fiscal and budgetary services. We've done this for over 35 years.

