

Airbnb Technical Write-Up

Jonas, Theda, and Roman

INTRODUCTION

The goal of this project was to analyze the New York City Airbnb and rental markets to help a client determine the most advantageous option for renting their two-bedroom NYC apartment. With a focus on expected revenue and logistical concerns, the following research sought to answer if renting to short-term travelers through Airbnb or to long-term tenants through a lease was recommended.

The key questions were:

1. How does rental length impact the daily price of an Airbnb listing?
2. What is the impact of variables, including offered amenities or location, on daily price?
3. How does the revenue of Airbnb compare to that of a traditional lease?
4. What are the anticipated costs of running an Airbnb compared to leasing?

BACKGROUND

The motivation of this project was to create a visualization that would help our client analyze and compare the profitability of renting out their two-bedroom home through Airbnb vs. leasing long-term on the rental market. To obtain these results, data cleaning was performed on the raw data set from Insideairbnb in order to analyze the data range of Airbnb properties located in Manhattan. Additionally, it was recently reported that Airbnb has been on the decline. Therefore, it was in our client's best interest to take into consideration all available renting options and relatable costs that can impact their decision.

TECHNICAL DETAILS

Datasets from Insideairbnb and Streeteasy were cleaned and explored through Microsoft Excel with statistical fundamentals like the five number summary and standard scores. Microsoft Power BI was utilized to obtain the data from Excel to gain additional insights using correlation coefficients and data visualizations (scatterplots, profit calculators, line graphs, bar charts, heat maps, and slicers).

Airbnb Technical Write-Up

Jonas, Theda, and Roman

IMPLEMENTATION

The first step in the project was to explore the Airbnb NYC listing data from Insideairbnb, with tasks such as removing extraneous fields, narrowing the list of data to two-bedroom properties (no hotels or caves were left in), checking for missing or error values, and laying out initial descriptive statistics.

Descriptive Analysis of Two-Bed Data Set			
Rows	6563		
Count of Listings	6562		
	Daily Price	Minimum Nights Stay	Maximum Nights Stay
Min	\$10.00	1	1
Max	\$15,000.00	365	20000000
Mean	\$264.34	16.86726608	3613.259372
Median	\$190.00	5	365
Mode	\$150.00	30	1125
Standard Deviation	\$377.03	25.72587541	246888.2705

Figure 1: Descriptive statistics on the initial fields of interest: daily price, minimum nights stay, and maximum nights stay

With the summary statistics showing massive outliers in price, the next step was to use standard score to evaluate the appropriate range of outliers to remove from the dataset.

Standard Score Array	Number of Listings	Percentage of Total Listings
-1-0	4719	71.91%
0-1	1468	22.37%
1-2	266	4.05%
2-3	53	0.81%
3-4	22	0.34%
4-5	9	0.14%
5-6	9	0.14%
6-7	3	0.05%
7-8	3	0.05%
8-9	1	0.02%
9-10	2	0.03%
12-13	2	0.03%
16-17	1	0.02%
18-19	1	0.02%
25-26	2	0.03%
39-40	1	0.02%
Grand Total	6562	100.00%
Between -1 and 3		
99.15%		
Standard Score	Daily Price (no outliers)	
Min	\$10.00	
Max	\$1,368.00	
Mean	\$241.97	
Median	\$189.00	
Mode	\$150.00	

Airbnb Technical Write-Up

Jonas, Theda, and Roman

Figure 2: Using standard score method to identify outliers and run new potential descriptive statistics

Following this, we set out to get a better understanding of the relationships between price and several variables, including length of stay, amenities, and reviews. Rankings for each category were set up as follows:

Rental Length Category	Minimum Nights	Maximum Nights
Short	1	28
Long	29	1125
Flexible	Any	Any

Review Score	Review Category	Description
0	None	Unrated or Score of 0
1	Low	Score between 1-2.5
3	Average	Score between 2.5-4
4	High	Score between 4-5

Figure 3: Categories defined for rental length and review score

Top Amenities

- Cleaning Supplies
- Coffee Maker or Tea Kettle
- Dishwasher
- Essentials
- Extra Blankets and Pillows
- Free Parking
- Hair Dryer
- Heating
- HVAC
- Kitchen
- Linens
- Pet Friendly
- Security Camera
- Self Check-In
- Storage
- Towels/Linens
- TV
- Washer
- Wifi
- Workspace

Figure 4: Identified top 20 amenities to build 0-10 Amenities Score

At this point, additional data on renting units in New York City was pulled from Streeteasy with median rents for each neighborhood every month since 2010, checking for any data to be cleaned.

Airbnb Technical Write-Up

Jonas, Theda, and Roman

With the two sets of data on Airbnb and the rental market identified and cleaned, and with categories for analysis defined, these two sets were imported into Power BI for further investigation.

RESULTS

The first question we sought to answer was the effect of rental length on the price of Airbnb to see if renting for longer periods, or being flexible to many short-term travelers, would be a good recommendation. Comparing the daily rates of short, long, and flexible rental lengths demonstrated that there was no difference between the three variables.

Median Daily Price by Rental Length

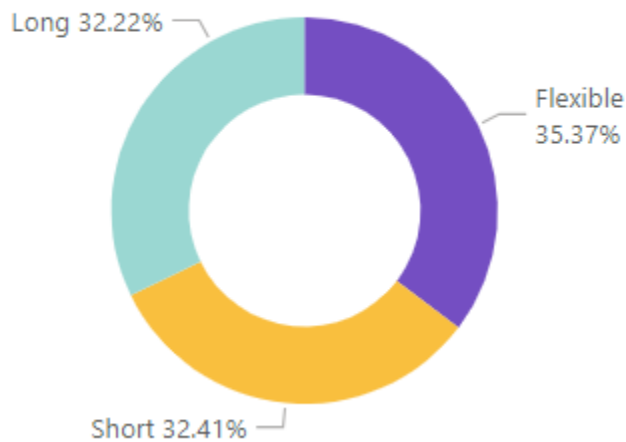


Figure 5: Daily Price comparison broken down into short, long, and flexible terms

With no conclusive recommendation, we looked at additional variables, such as amenities, room type, and review score, to observe their effects on daily price. Again, no correlations were found from the Insideairbnb data.

Airbnb Technical Write-Up

Jonas, Theda, and Roman

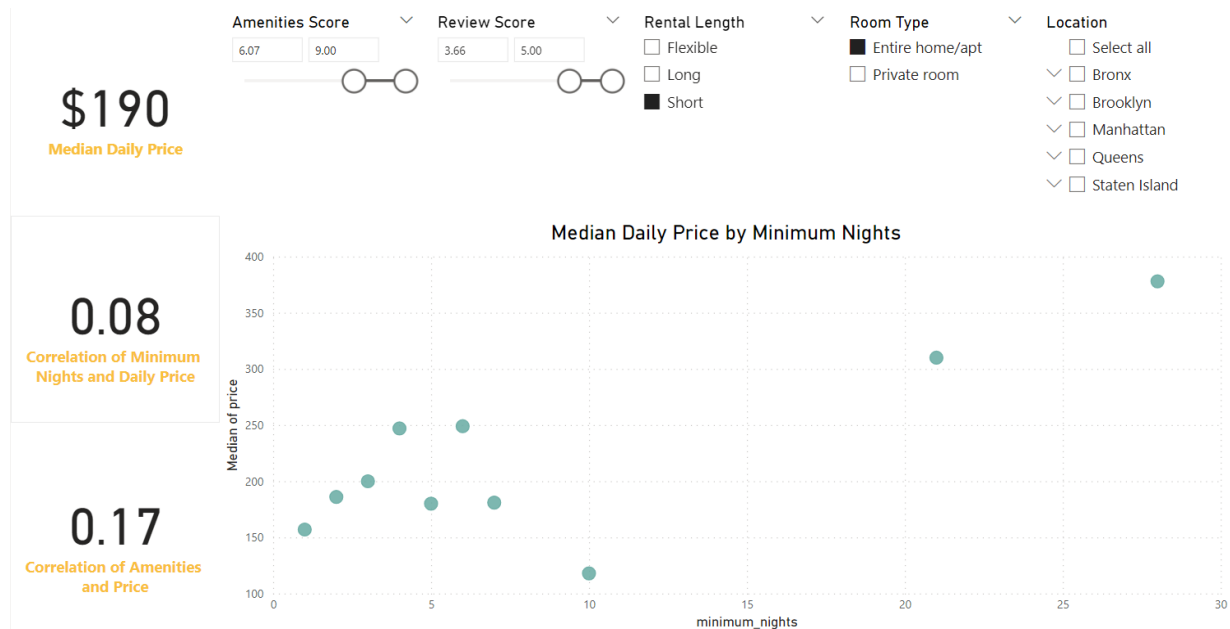
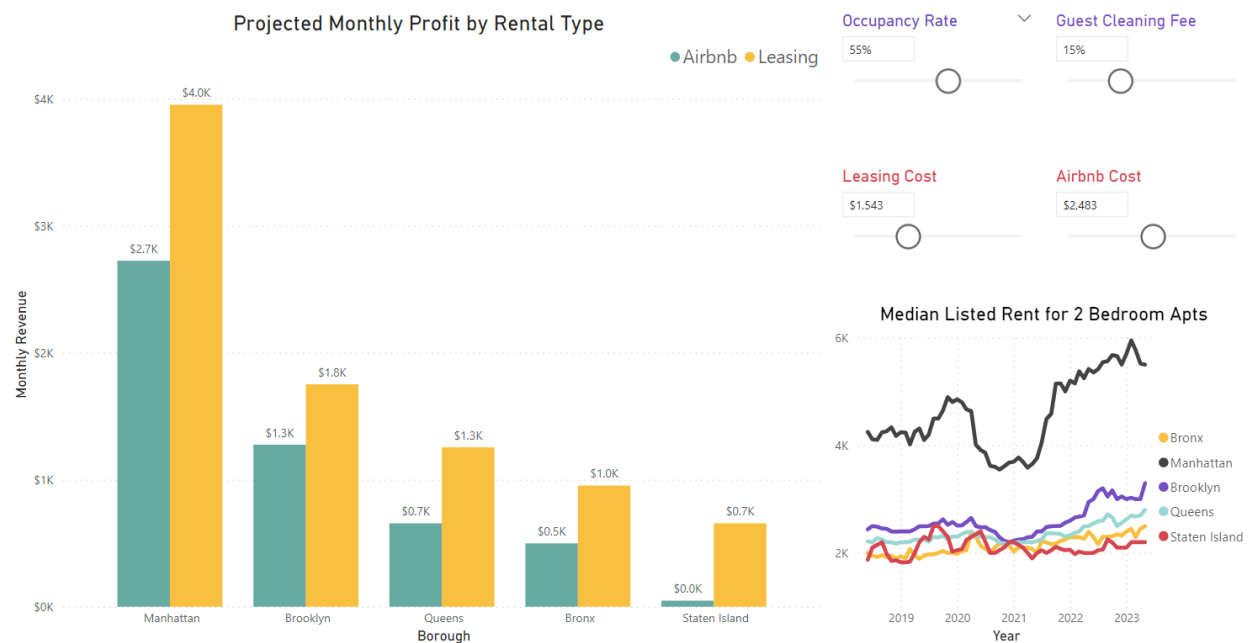


Figure 6: Scatterplot of daily price by minimum nights adjusted by numerous variables

In comparison, the data from Streeteasy showed a steadily increasing monthly rent for every New York City borough in the past decade. Then, when calculating profits for Airbnb vs. leasing based on estimated costs, occupancy rate (which is at 55% for frequently/recently booked NYC listings at the moment), and covered guest fees, it was clear that leasing was the more stable, profitable, and otherwise recommended option.



Airbnb Technical Write-Up

Jonas, Theda, and Roman

Figure 7: Median rent over time in NYC and a clustered bar chart showing the higher projected monthly profit by leasing over Airbnb

CONCLUSION

From our in-depth analysis of two-bedroom Airbnb rentals in the borough of Manhattan, we came to the conclusion that Sara would be more profitable leasing her two-bedroom property than using Airbnb for short-term stays.

We observed that seasonal occupancy can have an unpredictable effect on the profitability of an Airbnb, and there are rising local costs to maintain one. Through leasing, Sara would be able to capitalize on having a more stable income during the off seasons for Airbnb, and she would reduce the required costs of maintaining her property.

In order to provide Sara with the best profitable approach to renting out her two bedroom property, further analysis would need to be looked at in relation to how amenities and other factors affect the occupancy rate for Airbnb properties. We would also like to compare the stability of Airbnb to the overall rental market of Manhattan and do additional research into the estimated revenues from one- and two-year leases.

REFERENCES

1. Best Places to Invest in Vacation Rentals in 2021 & 2022:
 - a. <https://www.airdna.co/blog/best-places-to-invest-in-us-vacation-rentals-2021-2022>
2. The Biggest Mistakes Landlords Make That Kill Profit
 - a. <https://www.mysmartmove.com/SmartMove/blog/5-biggest-landlord-mistakes-kill-profit.page>
3. Rental Property Return Investment Tips:
 - a. <https://www.thebalancemoney.com/rental-property-investing-for-beginners-453821>
4. Return on Investment (ROI): How to Calculate It and What It Means
 - a. <https://www.investopedia.com/terms/r/returnoninvestment.asp>
5. 82% of people think Airbnb-ing their home is a good money-making strategy—here's what you need to know
 - a. <https://www.cnn.com/2019/07/03/is-running-an-airbnb-profitable-heres-what-you-need-to-know.html>
6. What regulations apply to my city?
 - a. <https://www.airbnb.com/help/article/961>
7. Airbnb Rules - New York, NY
 - a. <https://www.airbnb.com/help/article/868>
8. Hotel and Motel Occupancy
 - a. https://www.tax.ny.gov/pubs_and_bulls/tg_bulletins/st/hotel_and_motel_occupancy.htm
9. Sales Tax Rates, Additional Sales Taxes, and Fees
 - a. https://www.tax.ny.gov/pubs_and_bulls/tg_bulletins/st/sales_tax_rates_additional_sales_taxes_and_fees.htm
10. New York State Sales and Use Tax
 - a. <https://www.nyc.gov/site/finance/taxes/business-nys-sales-tax.page#:~:text=If%20products%20are%20purchased%2C%20an.State%20tax%20will%20be%20charged.&text=The%20City%20charges%20a%2010.375.storing%20motor%20vehicles%20in%20Manhattan.>
11. Hotel Room Occupancy Tax
 - a. <https://www.nyc.gov/site/finance/taxes/business-hotel-room-occupancy-tax.page>
12. Registration for Hosts (Short-Term Rentals)
 - a. <https://www.nyc.gov/site/specialenforcement/registration-law/registration-for-hosts.page>

Airbnb Technical Write-Up

Jonas, Theda, and Roman

13. Notice of Adoption of Final Rules Governing Registration and Requirements for Short-Term Rentals
 - a. <https://www.nyc.gov/assets/specialenforcement/downloads/pdfs/FINAL-RULES-GOVERNING-REGISTRATION-AND-REQUIREMENTS-FOR-SHORT-TERM-RENTALS.pdf>
14. Long-term rentals in NYC
 - a. <https://www.airbnb.com/help/article/2484>
15. NYC Business - What's required to do business in New York City?
 - a. <https://nyc-business.nyc.gov/nycbusiness/startabusiness/>
16. Tenants' Rights and Responsibilities
 - a. <https://www.nyc.gov/site/hpd/services-and-information/tenants-rights-and-responsibilities.page>
17. ABC's of Housing
 - a. <https://www.nyc.gov/site/hpd/services-and-information/abcs-of-housing.page>
18. Housing Maintenance Code
 - a. <https://www.nyc.gov/assets/buildings/pdf/HousingMaintenanceCode.pdf>
19. AirBnb Service Fees
 - a. <https://www.airbnb.com/help/article/1857>
20. AirBnb Long Term Rentals
 - a. <https://www.igms.com/airbnb-long-term-rentals/#>
21. The Best Amenities to Offer Right Now
 - a. <https://www.airbnb.com/resources/hosting-homes/a/the-best-amenities-to-offer-right-now-203>
22. No More Airbnb in NYC? Behind The Legal Battle Over Short-Term Rentals, Pt.2
 - a. <https://www.bkreader.com/featured-news/no-more-airbnb-in-nyc-behind-the-legal-battle-over-short-term-rental-s-pt2-7232347>
23. Airbnb vs. Renting: Which strategy is best?
 - a. <https://moneytips.com/airbnb-vs-renting-which-strategy-is-best/>
24. Airbnb vs. long-term rentals: Which makes more money for landlords?
 - a. <https://www.brickunderground.com/rent/airbnb-vacation-rental-vs-long-term-which-makes-more-money-landlords-owners-rent-hop-airdna-nyc>
25. InsideAirBnb
 - a. <http://insideairbnb.com/get-the-data>
26. Streeteasy
 - a. [https://streeteasy.com/blog/data-dashboard/\[object%20Object\]](https://streeteasy.com/blog/data-dashboard/[object%20Object])
27. What Exactly Does an Airbnb Property Manager Do?
 - a. https://www.igms.com/airbnb-management/#What_Exactly_Does_an_Airbnb_Property_Manager_Do
28. How Much Does Short-Term Rental Insurance Cost?
 - a. <https://safely.com/articles/short-term-rental-insurance-cost/#insurance-cost>
29. Does Your Homeowners Insurance Cover Airbnb?
 - a. <https://www.investopedia.com/articles/insurance/120816/does-your-homeowners-insurance-cover-airbnb.asp>
30. Host Damage Protection
 - a. <https://www.airbnb.com/help/article/279>
31. Airbnb Cleaning Fee: Facts and Figures You Should Know
 - a. <https://www.igms.com/airbnb-cleaning-fee/>
32. The A-Z of Your Airbnb Service Fee
 - a. <https://www.igms.com/airbnb-service-fee/>
33. Airbnb Has a Plan to Fix Cleaning Fees
 - a. <https://www.nerdwallet.com/article/travel/airbnb-has-a-plan-to-fix-cleaning-fees>
34. How Much Does It Cost to Furnish an Airbnb?
 - a. <https://bnbtoolbox.com/blog/how-much-does-it-cost-to-furnish-an-airbnb>
35. How Much Will It Cost to Furnish an Airbnb?
 - a. <https://realestaterealitycheck.com/how-much-will-it-cost-to-furnish-an-airbnb/>
36. Airbnb Expenses To Keep in Mind if You're Going To Be a Host
 - a. <https://hospitable.com/airbnb-expenses/>
37. Zillow Listing Fees: Are They Worth the Cost?
 - a. <https://listwithclever.com/real-estate-blog/zillow-listing-fees/>
38. Breakdown of Property Management Fees for Vacation Rentals
 - a. <https://www.lodgify.com/guides/property-management/fees/>
39. What Are Average Property Management Fees?
 - a. <https://www.apartmentlist.com/rental-management/average-property-management-fees>
40. New and Improved Aircover for Hosts
 - a. <https://www.airbnb.com/resources/hosting-homes/a/new-and-improved-aircover-for-hosts-469>

Airbnb Technical Write-Up

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