

Airbnb Case Study – Simple Financial Analysis and Business Modeling Project

1. What is the average listing price per market?

MARKET	AVERAGE PRICE PER NIGHT	RANK
Austin	\$180.14	1
Amsterdam	\$151.71	2
New York	\$130.36	3
Taipei	\$52.88	4

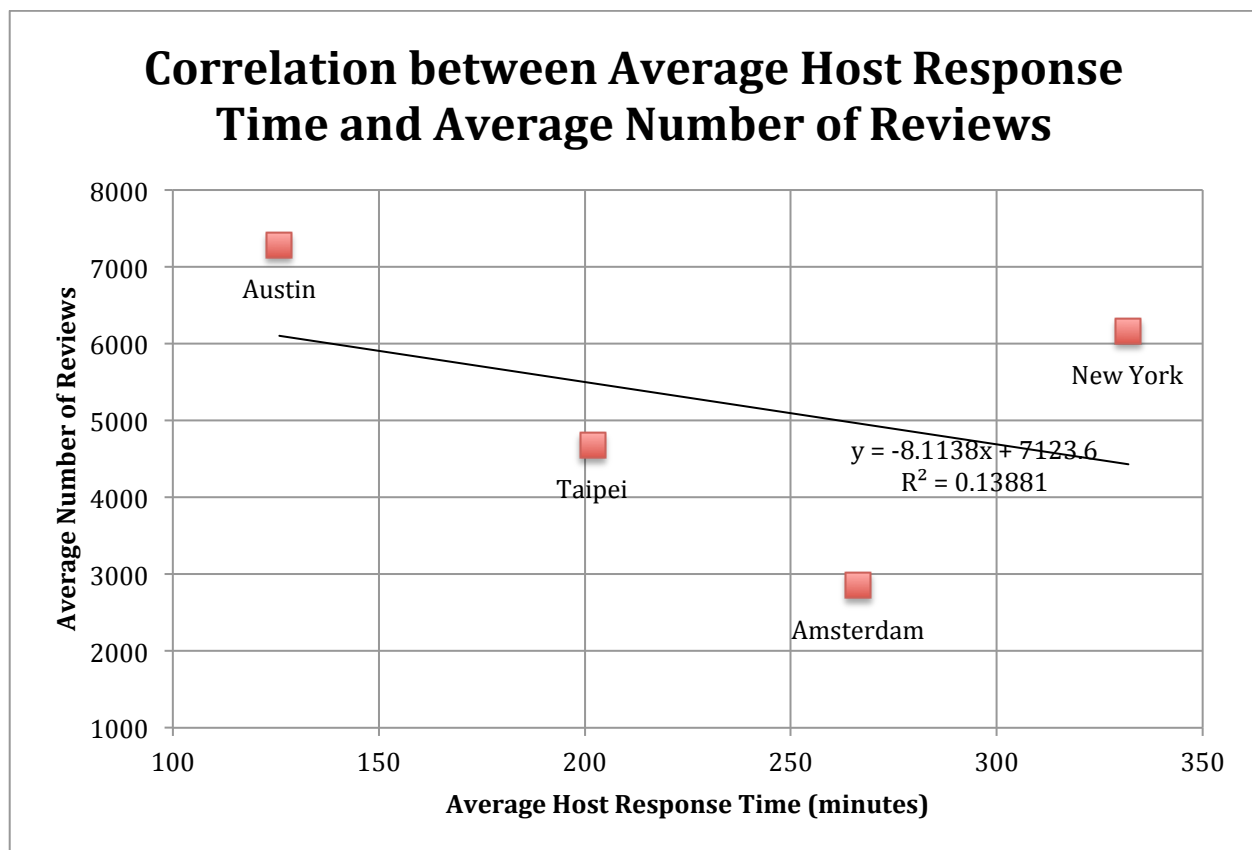
2. What is the property distribution type per market?

Market	Property Type	Count	Percent of Property Types
Amsterdam	Apartment	45	65.22%
	Bed and breakfast	7	10.14%
	Boat	3	4.35%
	Guest suite	5	7.25%
	Houseboat	2	2.90%
	Loft	1	1.45%
	Other	1	1.45%
	Serviced apartment	2	2.90%
	Townhouse	3	4.35%
Austin	Apartment	8	11.59%
	Bungalow	1	1.45%
	Condominium	5	7.25%
	Guest suite	2	2.90%
	Guesthouse	10	14.49%
	House	41	59.42%
	Townhouse	2	2.90%
New York	Apartment	50	71.43%
	Bed and breakfast	2	2.86%
	Condominium	3	4.29%
	Guest suite	1	1.43%
	House	5	7.14%
	Loft	4	5.71%
	Townhouse	5	7.14%
Taipei	Apartment	46	65.71%
	Condominium	4	5.71%
	Guest suite	2	2.86%
	Hostel	10	14.29%
	House	2	2.86%
	Loft	5	7.14%
	Serviced apartment	1	1.43%

3. Is there a correlation between Average Host Response Time and Number of Reviews?

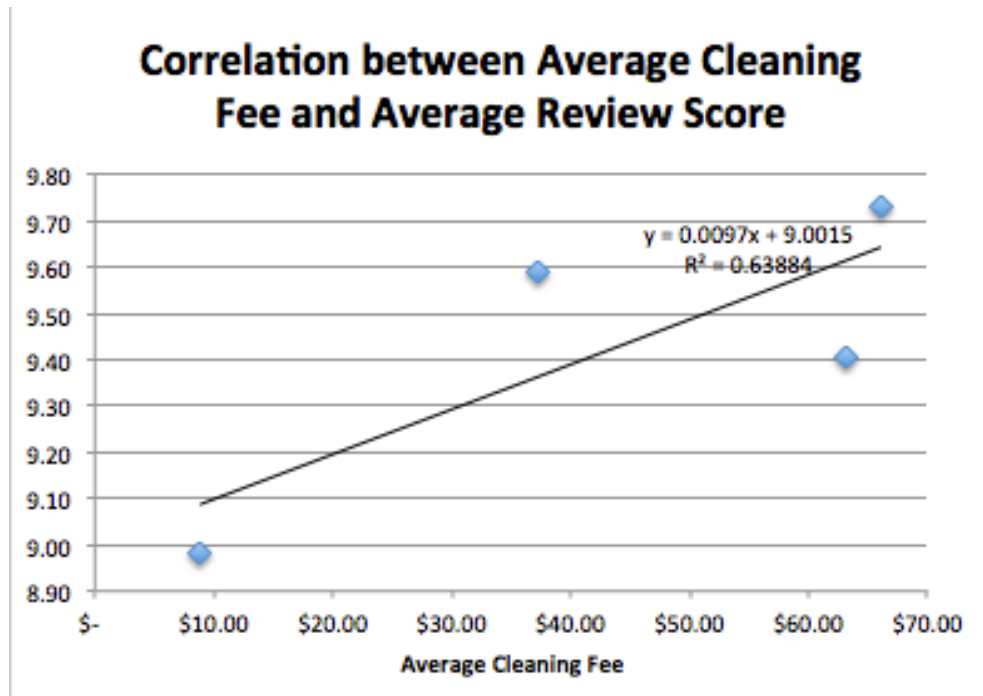
Market	Average Host Response Time	Average Number of Reviews	Correlation Coefficient	Coefficient of Determination	Outliers
Amsterdam	266.3333333	2849	-0.3725488	0.138792616	FALSE
Austin	125.86	7284			FALSE
New York	331.98	6168			FALSE
Taipei	201.94	4679			FALSE

Functions	Values for Average Number of Reviews
Q1	4221.5
Q3	6447
IQR	2225.5
Lower Bound	883.25
Upper Bound	9785.25



4. Is there a correlation between Average Cleaning Fee and Average Review Scores?

Market	Average Cleaning Fee	Average Review Score	Correlation Coefficient	Coefficient of Determination
Amsterdam	\$37.20	9.59	0.799272026	0.638835771
Austin	\$66.09	9.73		
New York	\$63.08	9.40		
Taipei	\$8.84	8.98		



5. How many listings per city are making more than the average profit per city? Based on yearly profits, what is the most attractive market for new host listings?

Market	Average Year Profit	Listings > Avg yr Profits	Percent Above Market
Amsterdam	\$11,878.15	26	38%
Austin	\$24,590.72	19	28%
New York	\$20,684.56	31	44%
Taipei	\$7,862.54	33	47%
Mean			39%

According to the table above, the most attractive markets for new hosting listings would be in the New York and Taipei markets.

MY OWN QUESTIONS & ANALYSIS

Exploration of ideal property types to maximize profits

I wanted to extend the last question scope of the project and ask which type of property would benefit from a specific market and what specific variables of said market would contribute in determining the ideal property type for new listings.

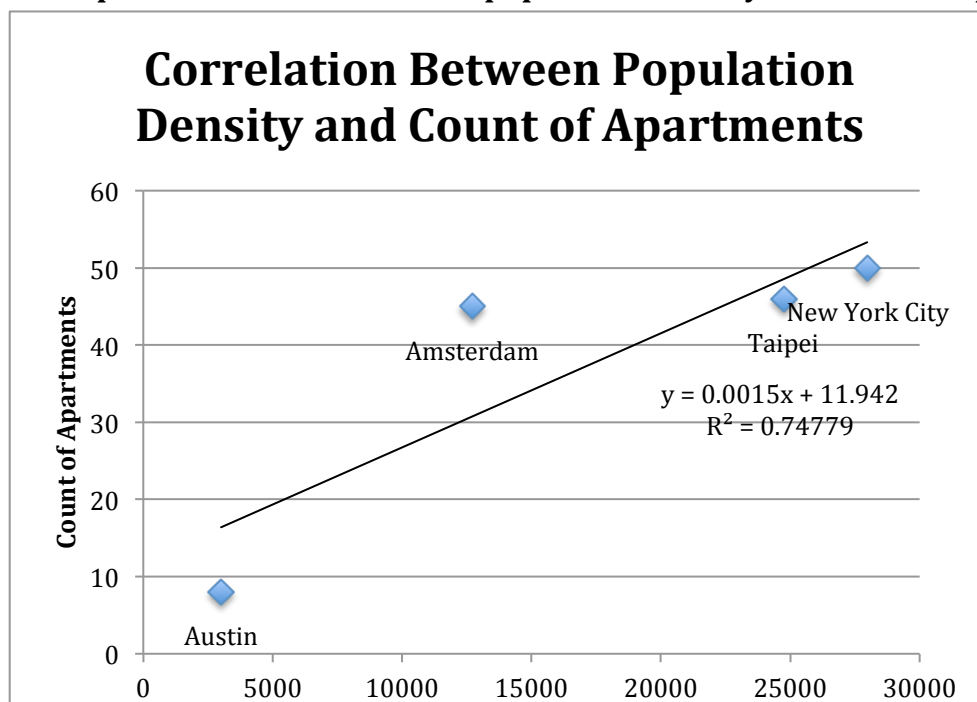
When I was making the Excel PivotTables for the first couple of questions, I was really intrigued with the pattern seen in the count of the apartments. Why did Austin have a higher distribution of houses as its main property listings while the other markets had apartments?

Well, from a real world perspective, apartments are an ideal way to cram a bunch of people and maximize an allotted space (AMA about my time living in Manhattan studios). I had to objectively back up my experience and assumptions about densely populated areas, which is seen in the table and graph below:

Figure 1a. Table of markets, respective population density, and respective count of apartments.

Market	Population Density (mi ²)	Count of Apartments	Correlation Coefficient	Coefficient of Determination
Austin	3005.93	8	0.864748733	0.747790371
Amsterdam	12710	45		
New York	27972.21	50		
Taipei	24760	46		

Figure 1b. Graph of correlation between population density and count of apartments.



I extracted the population density data from two sites (the sites are referenced in the readme in my github). As seen in the graph, there is high correlation between population density and the count of the apartment listings (correlation coefficient = 0.86) and the data is nicely fitted (coefficient of determination = 0.75).

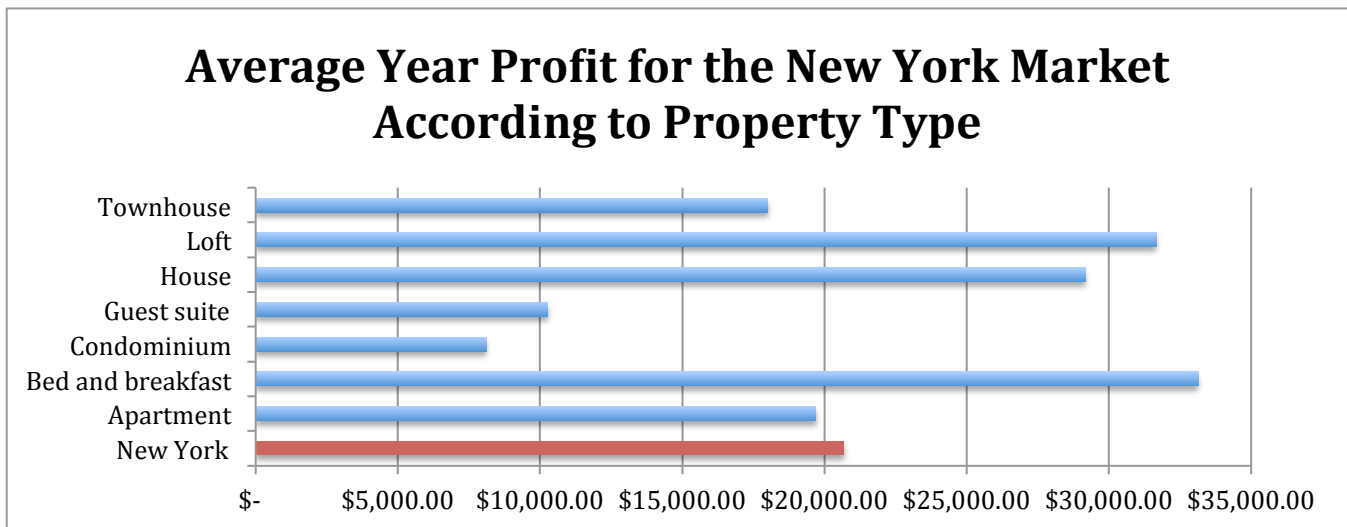
This information alone isn't sufficient to determine the ideal property type for specific market.

To continue on my analysis and the insights from Question #5, I wanted to see which property types generated more average yearly profits.

Figure 1c. Table of property types in New York and associated average yearly profits.

Property	Average Year Profit
New York	\$20,684.56
Apartment	\$19,692.57
Bed and breakfast	\$33,136.74
Condominium	\$8,099.32
Guest suite	\$10,257.38
House	\$29,164.97
Loft	\$31,657.04
Townhouse	\$18,001.82

Figure 1d. Bar graph of property types in New York and the associated average year profits.

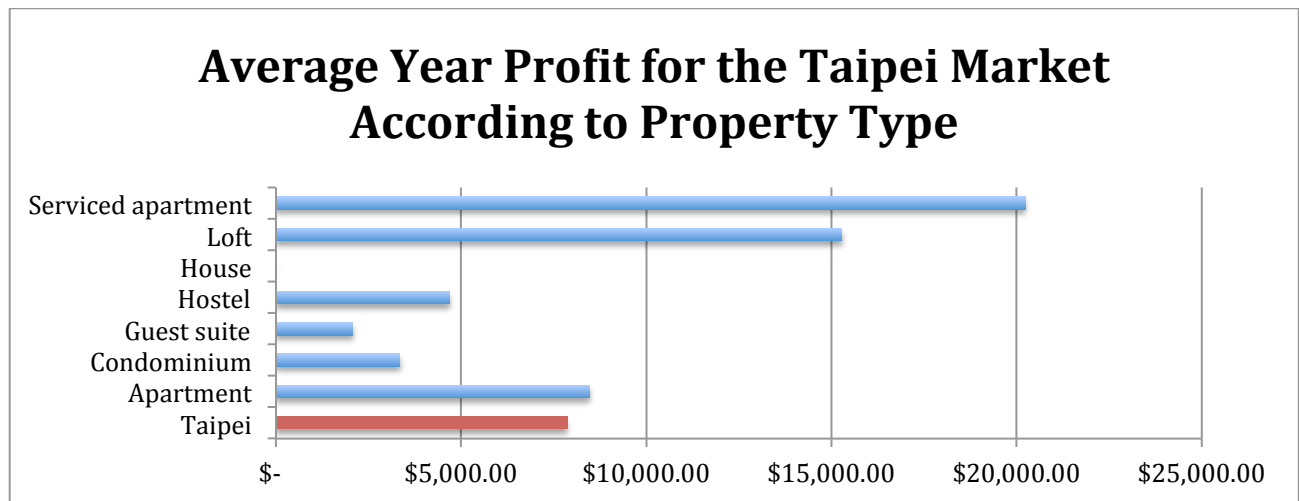


According to the graph above for the New York Market, lofts, houses, and bed & breakfasts are averaging more yearly profits than the rest of the property types. I am a bit skeptical to state that a new host should without a doubt list a loft, house, or bed & breakfast since the data shows that the aforementioned properties generate more profits; more analysis would have to be done since apartments make up the majority of listings (~71%).

Figure 1e. Table of property types in Taipei and its associated average yearly profits.

Property	Average Year Profit
Taipei	\$7,862.54
Apartment	\$8,462.83
Condominium	\$3,341.26
Guest suite	\$2,076.61
Hostel	\$4,691.43
House	\$0.00-
Loft	\$15,282.29
Serviced apartment	\$20,243.67

Figure 1f. Graph of property types in Taipei and its associated average yearly profits.



According to the graph above, apartments, lofts, and serviced apartments have generated more than the yearly average profits for the entirety of the Taipei market. As mentioned before with the distribution with the New York market, more analysis is required because the yearly average profit of the market is primarily determined by the percentage of apartment listings (~67%).

With all the information above, I see a dilemma: the data says that apartments are the most common property listings while having the most number of reviews and revenue BUT property types within densely populated markets (New York and Taipei) that are NOT apartments average considerable more profits (with the exclusion of apartments in Taipei that generate a bit more than average yearly profits of the entire market).

In consideration with the fact that apartment listings have more data associated with them, I would advise to determine the supply and demand relationship between property types mentioned in order to evaluate if increasing listings of the respective property types would maximum marginal revenue.

Exploration of host responsibility to maximize profits

My intrigue in the relationship between host responsibility (average time for host to respond) and the maximization of profits was sparked from Question #3. Since there was a weak, negative correlation between host response time and number of reviews, I wanted to explore if there was another variable involved in the hosts' response times.

I was interested in if there was a level of proactivity involved between the hosts with higher listing prices.

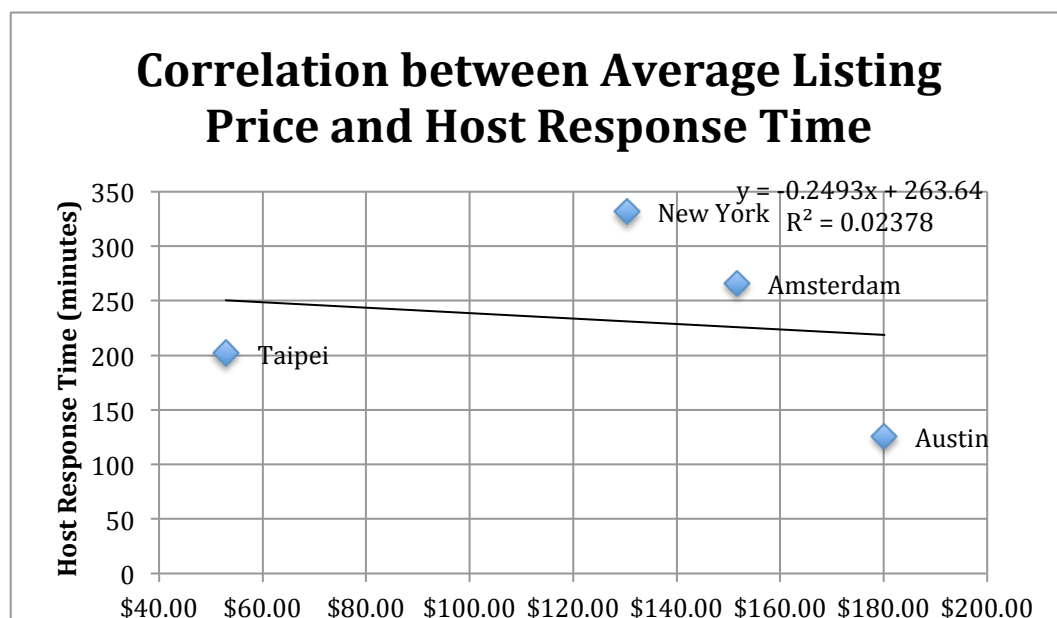
Figure 2a. Table of the markets, its respective hosts' response times, and the respective average price per night.

Market	Average Host Response Time	Average Price Per Night	Outlier?
Amsterdam	266.3333333	\$151.71	FALSE
Austin	125.86	\$180.14	FALSE
New York	331.98	\$130.36	FALSE
Taipei	201.94	\$52.88	FALSE

Figure 2b. Table of the associated descriptive statistics

Functions	Values
Q1	110.99
Q3	158.8175
IQR	47.8275
Lower Bound	39.24875
Upper Bound	230.55875
Correlation Coef.	-0.154104868
Determination Coef.	0.02374831

Figure 2c. Graph of the correlation between listing price and host response time



As seen in the graph above, the data is a poor fit (determination coefficient = 0.023) and there is a weak, negative correlation (correlation coefficient = -0.154).

I guess my assumption was wrong. *Or is it?*

I utilized the IQR method to see if I could *statistically* remove omit data from the Taipei method. I could not. So I must appeal to rationalization in order to justify removing the data.

“Higher” is the operative word in the context of the relationship between proactive hosts with higher listing prices. The New York, Amsterdam, and Austin markets are in countries where the developed economic status has been long withstanding. Taiwan, on the other hand, has recently changed its economic status to “developed” in the WTO as recently as 2018. Subsequently, the cost of living is dramatically different when comparing Taipei with the other markets. Therefore, the determination of the word “higher” is relative to similar markets and their respective rates.

Figure 2d. Graph of the correlation between listing price and host response time excluding the Taipei market

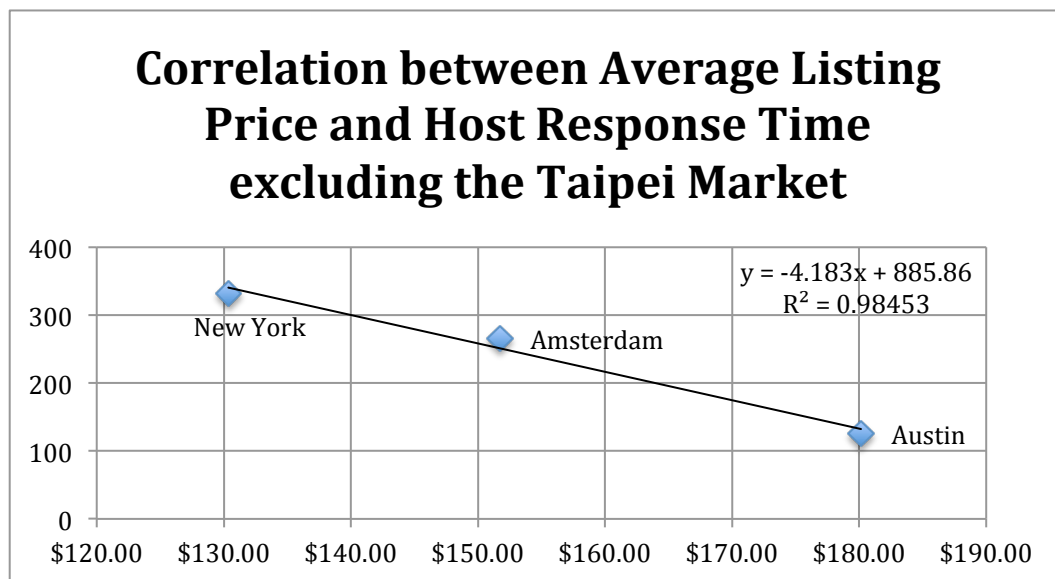


Figure 2e. Table of the associated descriptive statistics

Functions	Values
Correlation Coef.	-0.992238564
Determination Coef.	0.984537368

As seen in the graph above, there is a stronger fit in the data (determination coefficient = .09845) and a strong, negative correlation (correlation coefficient = -0.99) when excluding the Taipei market.

I still don't believe that my assumption is correct. I would be more assured if the data included markets with similar economies and more analysis was done.

It's also interesting to see that the markets in figure 2d are also of decreasing population density.

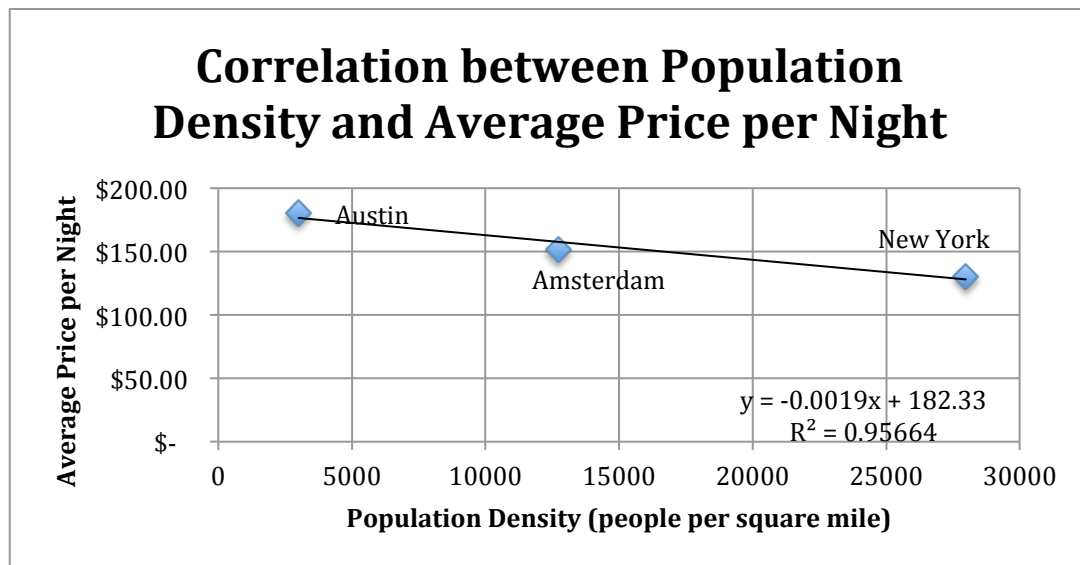
Figure 2f. Table of markets with its respective population density and average price per night

Market	Population Density (mi ²)	Average Price per Night
Austin	3005.93	\$180.14
Amsterdam	12710	\$151.71
New York	27972.21	\$130.36

Figure 2g. Table of descriptive statistics

Functions	Values
Correlation Coef.	-0.978080394
Determination Coef.	0.956641258

Figure 2h. Graph of correlation between population density and average price per night



As we can see in the graph, there is a strong, negative correlation between population density and the average price per night (~ -0.978) and the data is a nearly perfect fit (~ 0.957).

CONCLUSIONS

1. For densely populated markets, apartments are the most common property types.
 - a. Property types that are not apartments have a higher average yearly profit, but apartments do generate more revenue since there are more apartments in general.
 - i. More analysis is required to determine if adding more listings would disturb the market equilibrium.
2. In economically similar markets, there are strong correlations.
 - a. There is a strong, negative correlation between average price per night and host response time.
 - b. There is a strong, negative correlation between the population density and average price per night.
 - c. Markets with smaller population density will tend to not have apartments as the main property type listings while having demanding a higher price per night.