

# Airbnb effect on housing price

## Hypothesis:

Airbnb price has strong **correlation and causation** with rental rates and house prices in at

### Overview :

Airbnb has been launched since 2008. This new and popular short term leasing platform give many house owner a chance to rent their house to tourist in short term. This convenience also lead to other unpredicted situation. Based on recent change in housing market, many researchers started to blame airbnb for contributing to the increasing housing price.

However, housing price can be influenced by many factors, I will choose the airbnb from different type of cities to see the overall influence(Chicago, Boston, Seattle, San Francisco, etc.). For the time period, I will use the last 5 years airbnb data in those specific cities and explore its possible correlation and causation with those cities' housing price on Zillow.

### Data source:

1. Airbnb data source: <http://insideairbnb.com/get-the-data.html>

2. Zillow housing related data source <https://www.zillow.com/research/data/>

### Methodology:

Correlation is not the same as causation. However, we can try to prove whether these two trend has correlation. If they do not have correlation, then they must not be the causation relationship.

Here, we will use pandas in python and Jupyter notebook to compare below those 2 type of analysis.

1. The trend of airbnb price and Zillow rental rate
2. The ratio of Airbnb short term rate option to Zillow housing price and the ratio of Zillow long term rental rate to Zillow housing price.

### Result:

	RegionName	2015-06	2016-06	2017-06	2018-06	2019-03
1	New York, NY	2200.0	2200.0	2195.0	2195.0	2150.0
2	Los Angeles-Long Beach-Anaheim, CA	1725.0	1850.0	1968.5	2035.0	2125.0
3	Chicago, IL	1395.0	1425.0	1425.0	1495.0	1595.0
7	Washington, DC	1750.0	1735.0	1795.0	1800.0	1850.0
10	Boston, MA	1975.0	1995.0	1995.0	2090.0	2100.0
11	San Francisco, CA	2549.5	2700.0	2718.0	2631.0	2795.0
15	Seattle, WA	1545.0	1664.0	1850.0	1865.0	1826.5
17	San Diego, CA	1617.5	1620.0	1771.0	1920.0	1855.0
23	Portland, OR	1230.0	1395.0	1390.0	1395.0	1395.0
35	Austin, TX	985.0	1070.0	1090.0	1169.0	1221.0
37	Nashville, TN	1100.0	1397.0	1410.0	1380.0	1393.0
45	New Orleans, LA	1150.0	1195.0	1150.0	1095.0	1087.0

Price of long term rental rate for 1b apt. on Zillow

### Result:

year	2015	2016	2017	2018	2019
category					
austin	933.0	NaN	1728.0	1945.0	2169.0
boston	689.0	905.0	1171.0	1426.0	1525.0
chicago	1230.0	NaN	965.0	1230.0	1366.0
losangeles	3834.0	4920.0	6833.0	8626.0	9534.0
nashville	261.0	421.0	560.0	708.0	748.0
neworleans	543.0	780.0	1040.0	1061.0	1210.0
newyork	8414.0	9887.0	9761.0	11037.0	11728.0
oakland	295.0	416.0	NaN	699.0	721.0
portland	468.0	697.0	824.0	1109.0	1276.0
sandiego	687.0	1169.0	NaN	1925.0	2226.0
sanfrancisco	1409.0	1807.0	1971.0	852.0	1717.0
seattle	766.0	1071.0	NaN	2336.0	2585.0
washington	1175.0	NaN	2146.0	2336.0	2309.0

Number of Airbnb 1b apt. from 2015-2019 on Airbnb

year	2015	2016	2017	2018	2019
category					
austin	202.395498	NaN	196.652199	182.682262	170.627017
boston	199.114659	184.434254	182.962425	210.654278	183.331803
chicago	144.454472	NaN	127.753368	121.067480	123.987555
losangeles	142.575639	138.466667	140.489829	138.369001	137.683868
nashville	134.559387	119.828979	139.953571	160.283898	183.536096
neworleans	159.173112	156.820513	142.842308	125.654100	136.004959
newyork	182.069170	172.188227	168.429054	165.793694	171.005798
oakland	112.077966	122.009615	NaN	117.937053	121.030513
portland	105.878205	107.220947	106.861650	104.895401	100.358934
sandiego	178.842795	146.159966	NaN	138.035325	138.181941
sanfrancisco	211.564940	229.749308	234.531710	173.215962	176.269074
seattle	134.357702	116.107376	NaN	134.294521	138.392263
washington	134.439149	NaN	199.610438	173.833904	157.898224

Price of 1b apt. from 2015-2019 on Airbnb

### Future work:

In order to prove the causation of airbnb and long term rental rate and housing price. We will try to control the **unobserved factor** in the dataset.

1. Control **Zip-code level effect** to compare the area that has airbnb housing and the areas that does not have airbnb housing.

2. Control **Arbitrary city level time trends**, such as popularity, economic growth rate of specific city, to eliminate other factors that we do not want to involve in.

After eliminate those factors we can see the real effect that airbnb put on the long term rental rate market and housing market.