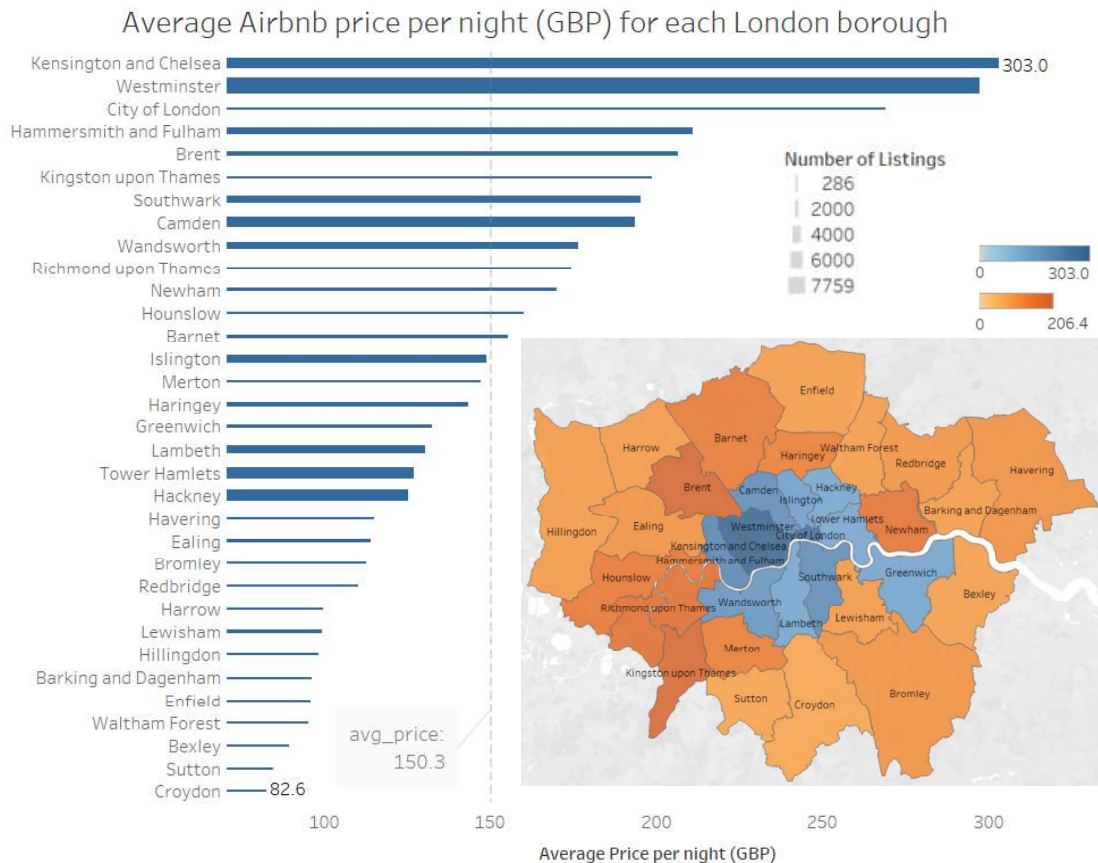


# SMM635 — Data Visualisation

Exploratory data analysis for property investment in London

## Airbnb room prices

Average prices of Airbnb rooms per night (in GBP) are shown for each of the 33 boroughs of London. The thickness of the bar represents the number of listings in that borough. Inset is a geo-plot showing the same segregated by inner (blue) and outer (orange)

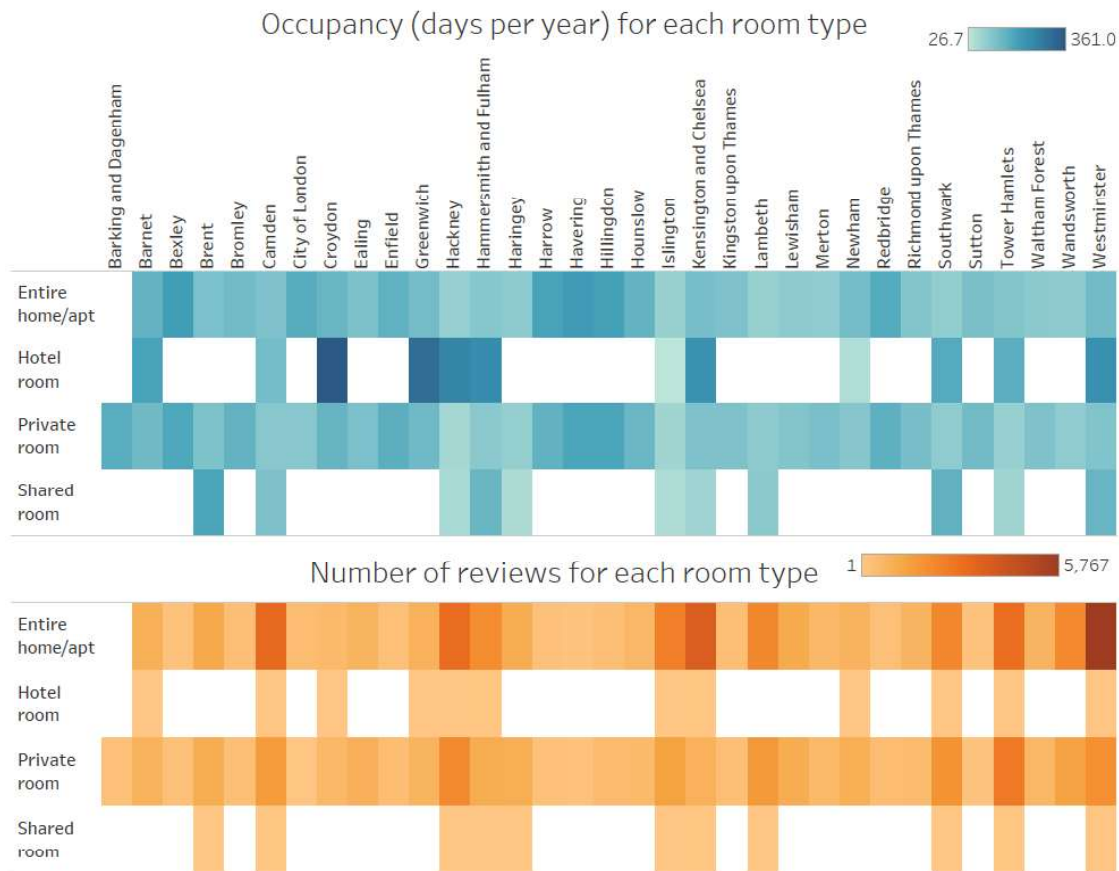


This analysis aims to identify the profitable boroughs of London to buy properties in and rent them out on Airbnb, for a real estate firm. For this purpose, 3 sources of information were collated; Airbnb listings over the past year (Sept 2021-22) <sup>[1]</sup>, average historical housing prices in London (1996-2022) <sup>[2]</sup> and annual council tax data by borough <sup>[3]</sup>.

The first question to answer is what the average prices per night for a room on Airbnb are for each of the boroughs. From the above visualization, we see that Kensington and Chelsea has the highest average price per night, followed by Westminster while Croydon has the lowest. The average price for the whole of London is £150.3. Westminster has the highest number of listings and higher price as well, which can be explained due to its proximity to tourist attractions as can be seen in the geo-plot. City of London has high average price, however, low number of listings.

## Popularity of Listings

Heatmaps showing the popularity of each room type by occupancy (top) and by the number of reviews (bottom).

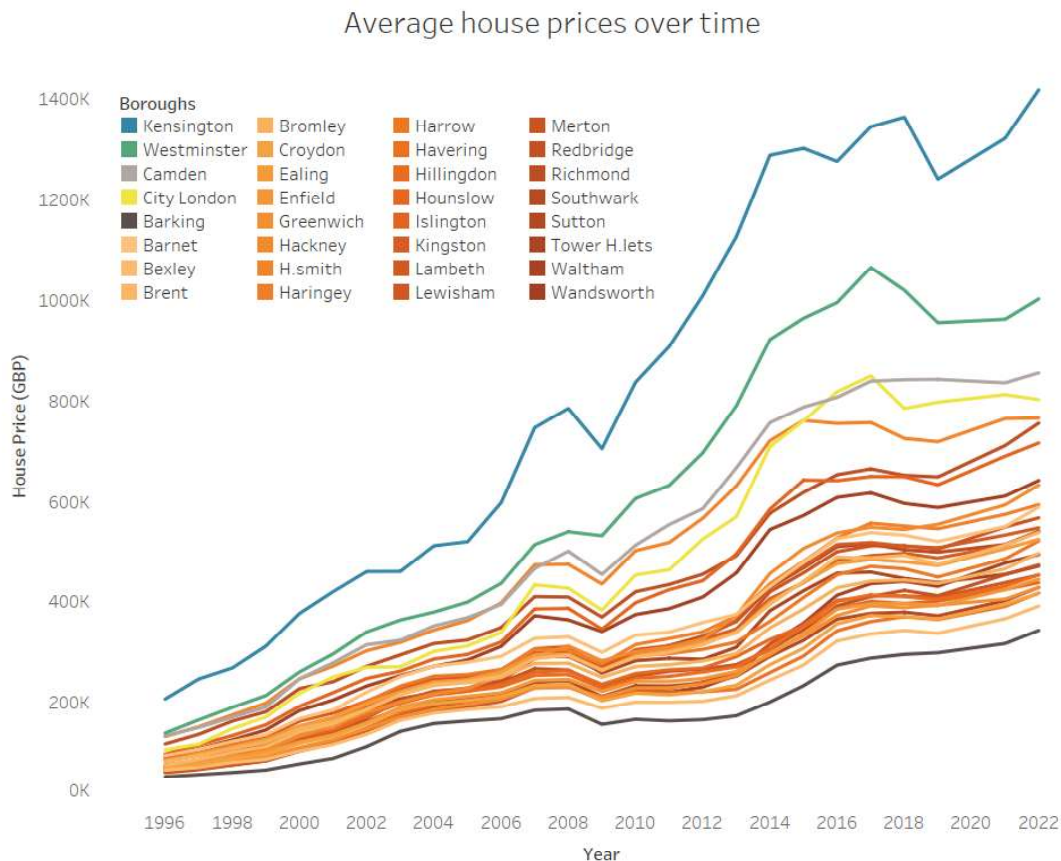


In order to obtain deeper insights into the listings, the popularity of each type of room listed was analysed. Popularity was measured in two ways –by the number of reviews and by occupancy. Using the number of reviews alone can lead to skewed insights as not all renters leave a review. Therefore occupancy, which is the number of days per year for which the listing was occupied, was calculated as *(the number of reviews per month x number of nights of stay x 12)*.

It can be observed that entire homes or apartments and private rooms are the common types of rentals across all boroughs. In terms of the number of reviews, Westminster has the highest number of reviews which also aligns with the high number of listings in that borough. It can be seen that hotel rooms generally have a higher occupancy than other types of rooms, with the highest in Croydon. Two boroughs, namely Islington and Hackney (non-hotel) stand out with low occupancy rates. In the following analysis, only those listings which have more than 50 reviews have been considered.

## Time series analysis of house prices

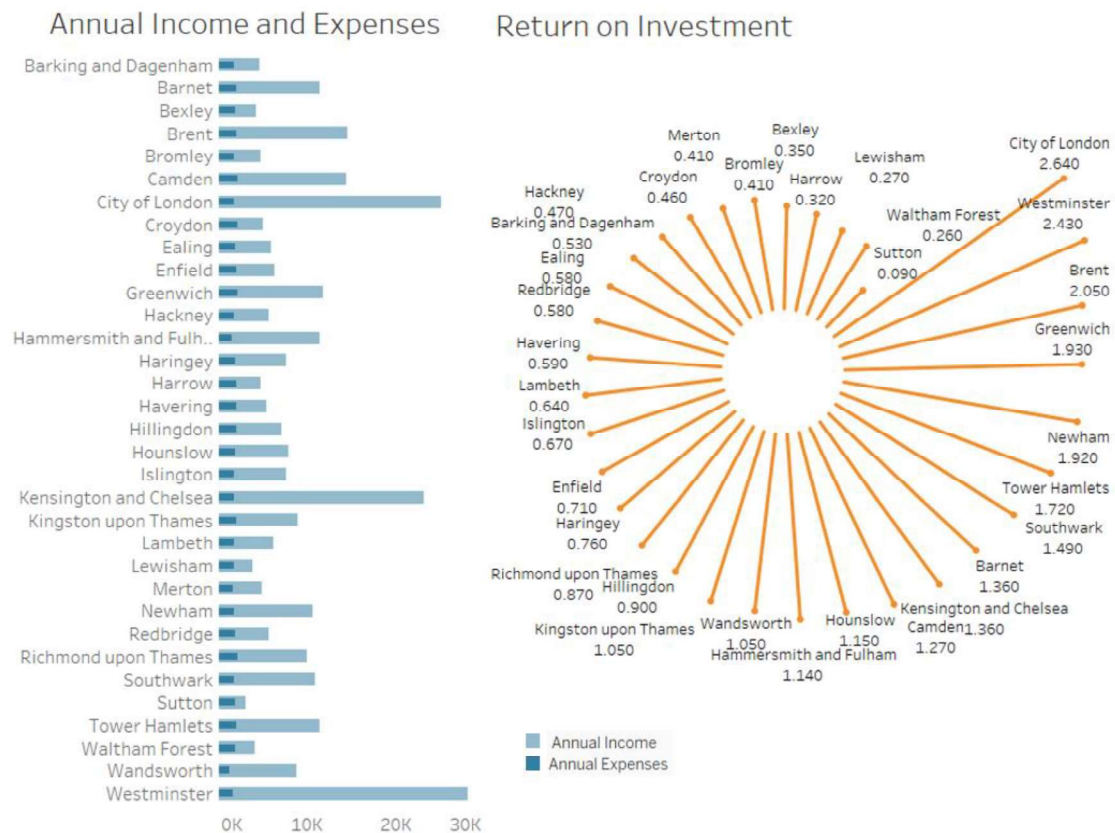
Trends of average house prices over time for each borough.



After gaining insights from Airbnb listings, trends in the housing market in London are analysed through historical data. The above chart shows that in general, there is an upward trend in the average housing price for every borough over the years from 1996 to 2022. The rate of increase is maximum for Kensington and Chelsea followed by Westminster, Camden and City of London while the lowest rate of increase is for Barking and Dagenham, as indicated by the slopes of the curves. A majority of the boroughs show similar rates of increase in price. A revealing insight from this visualization is that for all the boroughs there is a dip in house prices immediately after 2008. The global recession and the economic crisis that occurred during this time corroborate this observation. The dip in price is seen in 2019 as well, which could be due to Brexit. Furthermore, the Covid-19 pandemic (2020-21) does not seem to have a major impact on the prices. The rate of increase in the house price can be used in further analysis to gain insights into whether it is profitable to invest in a house and sell it at a later point in time.

## Profitability based on Return on Investment (ROI)

Chart with annual Income and expenses (left) and radial chart with ROI (right)

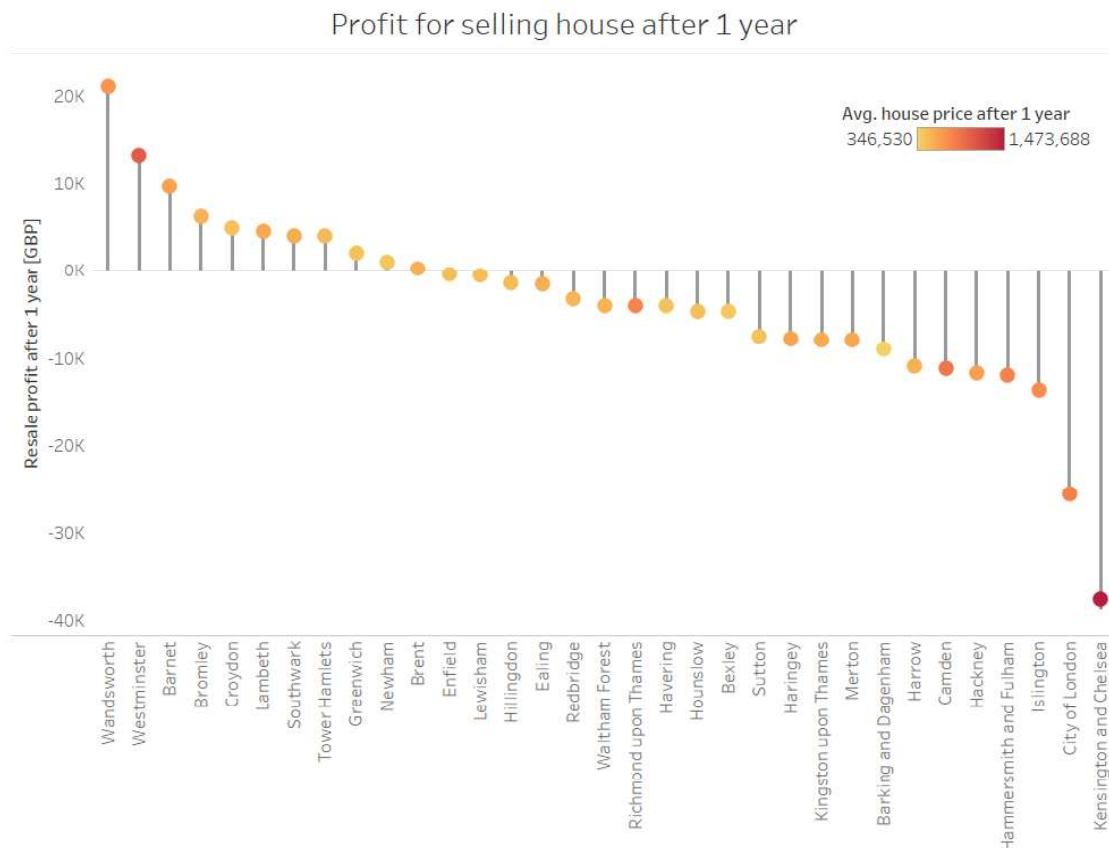


Using the value of occupancy calculated earlier, average annual income per borough is calculated by multiplying the occupancy by the borough's average Airbnb price per night. In order to calculate expenses, multiple categories are considered. The first is the cost of utilities consumed and expenses for maintenance after a letting. These are multiplied by the occupancy to get the utility cost. The second is the annual council tax which varies for each borough. These two costs are added to compute the annual expenses shown in the chart above. Annual return can then be calculated as the difference between the annual income and annual expenses. Return on Investment (ROI) is then calculated as the annual return divided by the total budget.

From the chart on the left, annual income is high for City of London, Westminster and Kensington and Chelsea. However, the ROI for Kensington and Chelsea is low due to high budget (house price) as seen earlier. From the radial plot, it can be seen that based on ROI, the most profitable boroughs to buy property are City of London, Westminster and Greenwich. The lowest ROI is for Sutton.

## Profitability based on the resale of the house after one year

A lollipop chart showing the average profit earned (in GBP) by selling the house after 1 year. Sticks show the amount of profit earned, while the tips are coloured by the estimated house price after 1 year.



A further analysis into the amount of profit that could be earned by selling a house after 1 year was undertaken. First, the average rate of increase in the housing price was calculated for each borough. This was used to estimate the price of a house in the following year. Profits were then calculated by subtracting from this estimate, the difference between the investment cost and the annual returns. The investment cost includes the purchasing price of the house and other initial costs.

From the above visualization, the top two profitable boroughs to buy property for resale are Wandsworth and Westminster. Kensington and Chelsea have high investment costs as seen earlier and as a consequence will result in a loss if the property is sold immediately after 1 year. This borough can however be considered for long-term investment.

## References

- [1] Inside Airbnb, <http://insideairbnb.com/get-the-data>, accessed on 3-12-2022.
- [2] UK House Price Index, Land Registry, <https://data.london.gov.uk/dataset/uk-house-price-index>, accessed on 3-12-2022.
- [3] Council Tax Levels, Ministries of Housing, Communities & Local Government, <https://www.gov.uk/government/statistics/council-tax-levels-set-by-local-authorities-in-england-2021-to-2022>, accessed on 3-12-2022