According to our research in question 6, entire home/apt and non-professional hosts (only have one Airbnb listing) are two significant factors of London Airbnb. Our following studies will make use of these two points.

Kundi的图

As shown in Table 2, we reference the Valuation Office Agency's published data to calculate the average daily income from long-term rentals in London (VOA), which amounts to £67 per day. Using data scraped from the Inside Airbnb dataset we estimate the average daily income from short-term lets (STL) to be £239. The estimated annual income for host in the VOA type is approximately £24,446. If the STL rental period stays within the legally permitted 90 nights per year, the annual income (£21,489) is slightly lower than that of the VOA type. When considering additional costs associated with STL, such as cleaning and vacancy risks, host are unlikely to withdraw their properties from the long-term rental market. However, if host exceed the 90-night limit (estimated at around 102 nights), the economic return from short-term rentals (£24,354) surpasses that of long-term rentals in the open market, indicating a high potential for speculative behavior.

Secondly, we choose “Airbnb Count Density”, “Single Host Counts 2024” and “Professional Host Counts 2024” as the independent variables and “Rental Price” as the implicit variable to explore the relationships between them. Although these four variables are not normally distributed, they can achieve a normal distribution through Box-Cox transformations.

放scatterplot

The scatterplot and correlation coefficient calculations point out that all of the three variables show a positive correlation with “rental price”, with “count density box-cox” being the strongest (correlation coefficients=0.932). Comparison of the middle and right-hand side plots reveals that an increase in the number of “PROhosts” (correlation coefficients=0.912) is positively correlated with “rental price”, probably because professional hosts are more inclined to offer higher-priced properties. The data points for non-professional hosts are more discrete (correlation coefficients=0.885), possibly indicating that single landlords do not dominate market prices. However, there may be a very large correlation effect between them.

To prepare for the Ordinary Least Squares (OLS) Regression, we carry out the Variance Inflation Factor (VIF) Test beforehand. The data for all the three independent variables are greater than 10, indicating that they have a high degree of multicollinearity. Therefore, we gradually removed the variables with the highest VIF values and recalculated the VIF. After removing the “PROhosts box-cox”, VIF data for both of the other two variables are below 10.

回归方程

According to the equation, "count density box-cox" has a significant positive effect on "rental price box-cox". This suggests that demand for housing in high density areas is usually greater and rental prices are therefore higher, especially in large cities (e.g. London) where there is a strong positive correlation between housing density and rents. However, the effect of "single host counts 2024 box-cox" on the dependent variable is not significant (p-value = 0.798). This indicates that the market behavior of non-professional landlords has a weak impact on the overall rent level. The rental market may be dominated by professional landlords, who usually offer higher prices and are more concentrated in the core area, while single landlords are mostly individual homeowners who lack the scale effect to influence market prices. The overall model explains “87.1%” of the variance in the dependent variable (R² = 0.871), which is a good fit, with residuals basically conforming to a normal distribution.

残差图

This map shows the spatial distribution of the residuals. The Red areas indicate positive residuals, where actual values are higher than model predictions, concentrated in the South West and South East regions of London. The Blue areas indicate negative residuals, where actual values are lower than model predictions, concentrated in the East and North East regions. Although there is some clustering of red and blue regions, there is no clear pattern of spatial clustering in the overall distribution. This is consistent with the results of Moran's I and p values. The small value of Moran's I and p-value > 0.05 indicate that the residuals are not significantly spatially clustered and the distribution is essentially random. Therefore, the spatial autocorrelation is not significant.

Recommendations

1 Strictly Enforce the 90-Day Limit: Regulate STL to prevent speculative activities that disrupt the housing market.

2 Neighborhood-specific Controls: Adjust Airbnb listings to align with local housing needs, promoting balance and sustainability.

3 Address Broader Influences: Consider landlord behavior, economic conditions, and structural factors in housing policy.

Limitations

1 Data Gaps: Missing values and incomplete neighborhood coverage affect analysis accuracy.

2 Spatial Variations: While residuals lack overall clustering, local spatial differences still require deeper investigation.

3 Box-Cox Transformation: Ensuring normality may alter some data’s original characteristics.

4 Temporal Discrepancies: Airbnb pricing reflects specific points in time, whereas local rents are annual averages.

5 Single-Year Data: The model captures only one year of data, limiting trend analysis.

Conclusion

Our analysis indicates the density of Airbnb listings as a key driver of local rental prices. Regulation of short-term rentals limited to 90 days and neighborhood-specific quantity controls are critical to achieving sustainability in the rental market.