Interpretation

2024-03-13

Pricing analysis

```
##    stay_type mean_price median_price min_price max_price      city
## 1  Long-stay   220.2174          192        60     800.0 Amsterdam
## 2 Short-stay   227.4495          200        24     869.1 Amsterdam
## 3  Long-stay 24806.7461        17857      1500  132657.1     Tokyo
## 4 Short-stay 27329.6999        21071      2500  132657.1     Tokyo
## 5  Long-stay   155.8592          123        17    1000.0    London
## 6 Short-stay   142.3455          110        12    1261.5    London
```

Disregarding room type and review scores, our analysis showed a marked difference in average pricing between short-term and long-term listings. In both Amsterdam and Tokyo, short-term stays exhibited a higher average price point compared to their long-term counterparts. Interestingly, London demonstrated an inverse trend, with long-term listings being generally more expensive.

Linear Regression

Amsterdam interpretation

Before interpreting the results it is good to establish a the baseline of the variables Stay_type_dummy = 0 (long-stay), room_type = "Entire home/apt", and review_scores_rating = 0 (max 5). Furthermore, the analysis will hold a 5% significance level. The main effect stay_type_dummy on the price suggests that on average a "long-stay" in 129 Euro lower than "short-stay". However, since the p-value (0.08)>0.05 this shows a marginally significant effect. Therefore, It can be concluded with 95% statistical confidence that duration of stay (short vs. long) does not differ much in price.

In contrast there are three variable that are statistically significant with a confidence level of 95%.

- **room_typeHotel room:** On average, a hotel room is priced 736 Euro lower in comparison to an entire home/apt (p-value = 0.0156).
- **stay_type_dummy * review_scores_rating:** The effect of "review_scores_rating" on price is different for "long-stay" listings compared to "short-stay". For "long-stay" listings, a one star increase in "review_scores_rating" is associated with a 32.4 Euro increase in price. This shows the moderation effect of reviews on the relationship between price and stay_type is significant (p-value = 0.0329)
- **room_typeHotel room * review_scores_rating:** For hotel rooms, a one review increase in "review_scores_rating" leads to an additional increase in price by 139 Euro, compared to the baseline 'Entire home/apt'. The shows the moderating effect of reviews on the relationship between hotel rooms and price is significant (p-value = 0.0315) .

Analysis of the Amsterdam listings reveals a lack of long-stay accommodations within the hotel and shared room categories. Consequently, coefficients for the interaction terms "long-stay", "hotel room", and "shared room" are necessarily represented as NA (not available). This aligns with the established short-term nature of hotel and shared room listings, which typically lack a 7-day minimum stay requirement.

Tokyo interpretation

As for the Airbnb listings in Tokyo, the baseline and significance level remains similar to Amsterdam. The main effect stay_type_dummy on the price suggests that on average a 'long-stay' in 33620 Yen lower than 'short-stay'. Since the p-value (0.00653) < 0.05 this implies that there is a significant difference in price between the listing with a short_stay vs long_stay in Tokyo.

Despite the lack of significance in the majority of the terms. The interaction between stay_type_dummy * review_scores_rating is significant. It implies that effect of "review_scores_rating" on price is different for "long-stay" listings compared to "short-stay". For "long-stay" listings, a one star increase in "review_scores_rating" is associated with a 7321 Yen increase in price. This shows the moderation effect of reviews on the relationship between price and stay_type is significant (p-value = 0.00515)

Like Amsterdam, Tokyo hotels listed on the platform primarily offer short-term stays. This lack of long-stay options prevents us from analyzing the interaction between "long-stay" and "hotel room" variables

London interpretation

Finally, the London Airbnb listings will be treated with the same baseline and significance level (5%). The main effect stay_type_dummy on the price suggests that on average a 'long-stay' is 56.8 Pounds lower than 'short-stay'. Since the p-value (0.0000124) < 0.05 this implies that there is a significant difference in price between the listing with a short_stay vs long_stay in London.

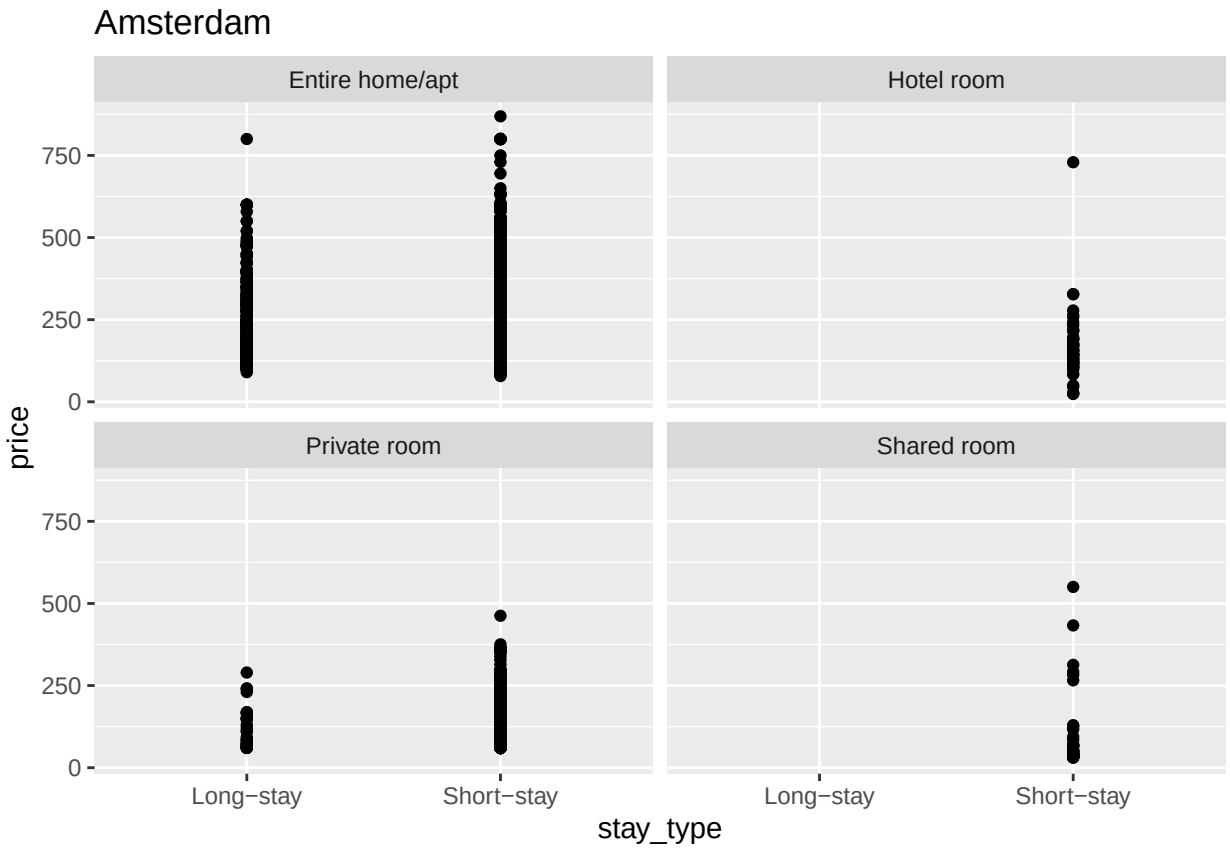
In addition there are 5 terms that are statisically significant with a confidence level of 95%.

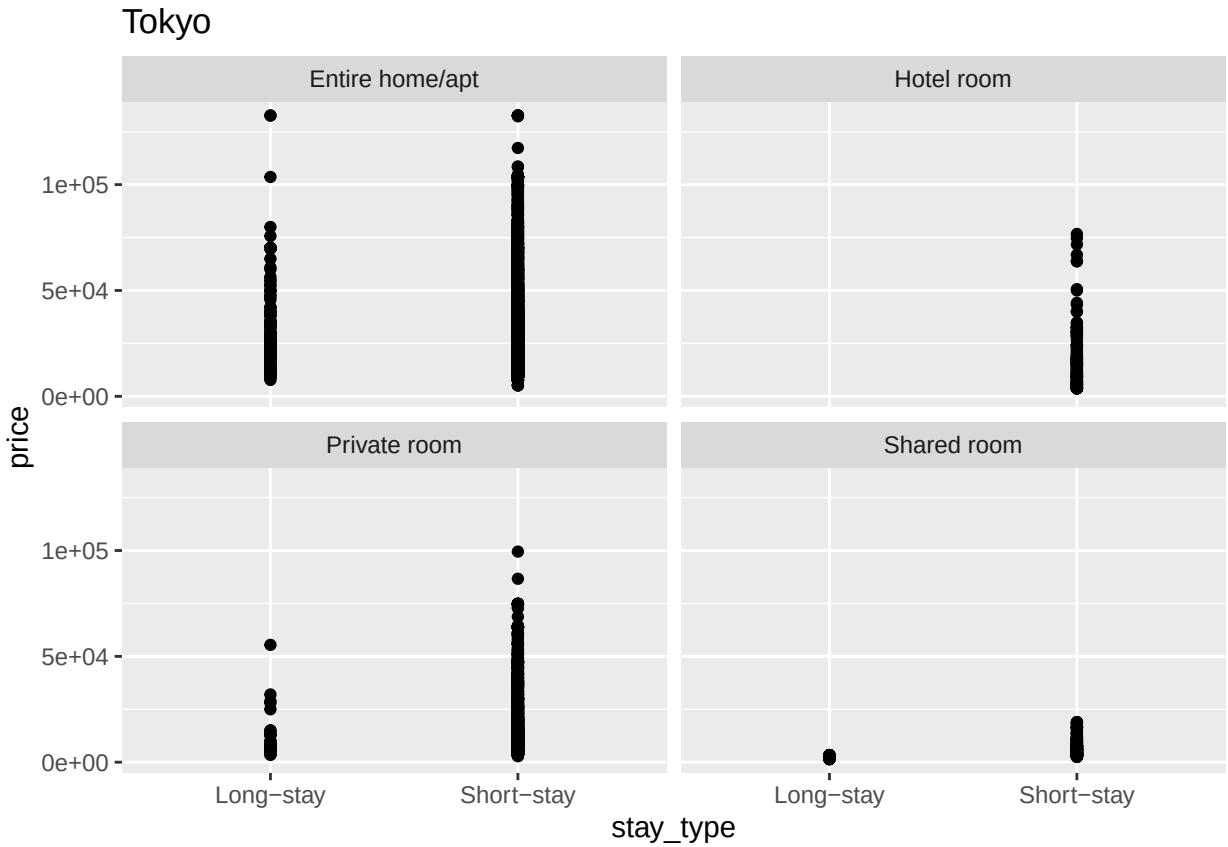
- **"room_typePrivate room":** On average, a private room is priced 147 Pounds lower in comparsion to an entire home/apt (p-value = 0.000000000116).
- **"stay_type_dummy * room_typePrivate room":** On average when a listing is a long stay in a private room in comparison to short stay in an entire home/apt , the first option is 91.3 Pounds more in the listing price (p-value = 0.0001.51)
- **"stay_type_dummy * room_typeShared room":** Similarly, on average when a listing is a long stay in a shared room in comparison to short stay in an entire home/apt , the first option is 277 Pounds more in the listing price. Evidently, the moderating effect of shared room on the relationship between price and stay_type is significant (p-value = 0.00843).
- **"stay_type_dummy * review_score_rating":** The effect of "review_scores_rating" on price is different for "long-stay" listings compared to "short-stay". For "long-stay" listings, an one star increase in "review_scores_rating" is associated with an average 11.8 Pounds increase in price. This shows the moderation effect of reviews on the relationship between price and stay_type is significant (p-value = 0.0000117)
- **"stay_type_dummy * room_typePrivate room * review_scores_rating":** On average when a listing is a long stay in a private room in comparison to short stay in an entire home/apt , and the review increase by one star it would decrease the listing price by 16.8 Pounds. Indicating that the moderating effect of private room and review score has a significant negative effect on the relationship between stay type and price (p-value = 0.000998).

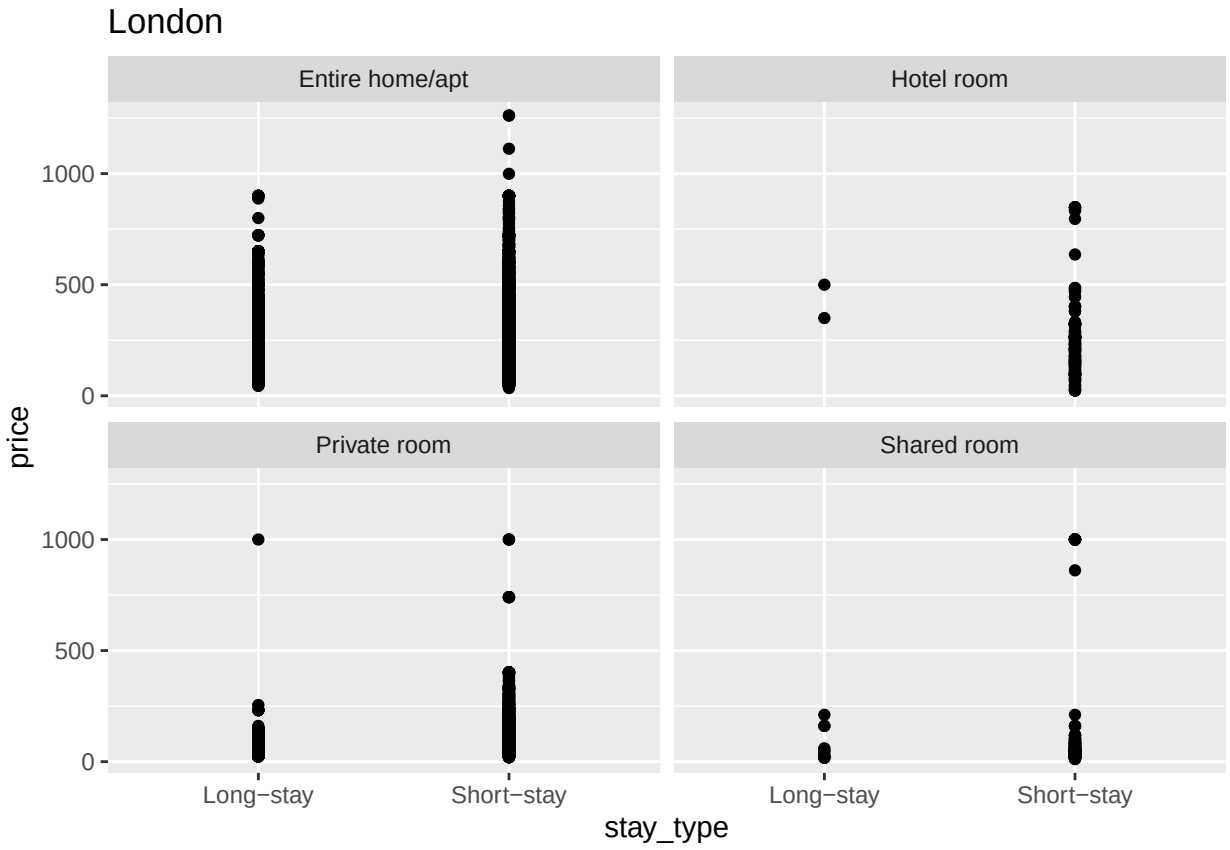
In contrast to listings located in Amsterdam and Tokyo, hotel and shared room options do long-term stay opportunities. However, graphical representations of the data underlines the limited availability of such listings. While some listing data exists within these categories, the analysis suggests that they do not exert a statistically significant impact on the main effect.

```
## City: Amsterdam
## # A tibble: 16 x 5
##    term                                  estimate std.error statistic p.value
##    <chr>                                    <dbl>     <dbl>     <dbl>   <dbl>
##  1 (Intercept)                              138.       66.6     2.07   0.0381
##  2 stay_type_dummy                         -129.       73.6    -1.75   0.0800
##  3 room_typeHotel room                     -736.      304.     -2.42   0.0156
##  4 room_typePrivate room                    185.      349.      0.531  0.596
##  5 room_typeShared room                    -475.      307.     -1.55   0.122
##  6 review_scores_rating                      18.4      13.7     1.34   0.182
##  7 stay_type_dummy:room_typeHotel room       NA        NA      NA     NA
##  8 stay_type_dummy:room_typePrivate room   -142.      354.     -0.400  0.689
##  9 stay_type_dummy:room_typeShared room      NA        NA      NA     NA
## 10 stay_type_dummy:review_scores_rating      32.4      15.2     2.13   0.0329
## 11 room_typeHotel room:review_scores_rating  139.      64.7     2.15   0.0315
## 12 room_typePrivate room:review_scores_rat~  -60.8     72.7    -0.837  0.403
## 13 room_typeShared room:review_scores_rati~   72.2     66.9     1.08   0.281
## 14 stay_type_dummy:room_typeHotel room:rev~   NA       NA      NA     NA
## 15 stay_type_dummy:room_typePrivate room:r~   27.3     73.6     0.372  0.710
## 16 stay_type_dummy:room_typeShared room:re~   NA       NA      NA     NA
##
## City: Tokyo
## # A tibble: 16 x 5
##    term                                 estimate std.error statistic  p.value
##    <chr>                                   <dbl>     <dbl>     <dbl>    <dbl>
##  1 (Intercept)                           39724.    12022.     3.30   9.56e-4
##  2 stay_type_dummy                      -33620.    12359.    -2.72   6.53e-3
##  3 room_typeHotel room                   -5719.    22522.    -0.254  8.00e-1
##  4 room_typePrivate room                -46575.    32481.    -1.43   1.52e-1
##  5 room_typeShared room                 -34779.    71294.    -0.488  6.26e-1
##  6 review_scores_rating                  -2183.     2544.    -0.858  3.91e-1
##  7 stay_type_dummy:room_typeHotel room      NA        NA     NA     NA
##  8 stay_type_dummy:room_typePrivate room 41820.    32917.     1.27   2.04e-1
##  9 stay_type_dummy:room_typeShared room  35401.    72143.     0.491  6.24e-1
## 10 stay_type_dummy:review_scores_rating   7321.     2616.     2.80   5.15e-3
## 11 room_typeHotel room:review_scores_rati~ -1289.   4843.    -0.266  7.90e-1
## 12 room_typePrivate room:review_scores_ra~  5829.   6925.     0.842  4.00e-1
## 13 room_typeShared room:review_scores_rat~  1639.   15065.    0.109  9.13e-1
## 14 stay_type_dummy:room_typeHotel room:re~    NA       NA     NA     NA
## 15 stay_type_dummy:room_typePrivate room:~ -7153.    7018.    -1.02   3.08e-1
## 16 stay_type_dummy:room_typeShared room:r~ -6879.   15251.    -0.451  6.52e-1
##
## City: London
## # A tibble: 16 x 5
##    term                                 estimate std.error statistic  p.value
##    <chr>                                   <dbl>     <dbl>     <dbl>    <dbl>
##  1 (Intercept)                            203.       12.1     16.8   6.27e-63
##  2 stay_type_dummy                        -56.8      13.0     -4.37  1.24e- 5
##  3 room_typeHotel room                   2406.     2016.       1.19  2.33e- 1
##  4 room_typePrivate room                 -147.       22.8     -6.45  1.16e-10
##  5 room_typeShared room                  -183.       95.0     -1.93  5.39e- 2
##  6 review_scores_rating                    -3.20      2.55    -1.25  2.10e- 1
##  7 stay_type_dummy:room_typeHotel room  -2384.     2017.      -1.18  2.37e- 1
##  8 stay_type_dummy:room_typePrivate room    91.3      24.1      3.79  1.51e- 4
```

```
##  9 stay_type_dummy:room_typeShared room      277.      105.       2.63  8.43e- 3
## 10 stay_type_dummy:review_scores_rating       11.8       2.75     4.29  1.77e- 5
## 11 room_typeHotel room:review_scores_rati~  -466.      432.      -1.08  2.82e- 1
## 12 room_typePrivate room:review_scores_ra~     3.22      4.84     0.665 5.06e- 1
## 13 room_typeShared room:review_scores_rat~    16.5      22.8      0.724 4.69e- 1
## 14 stay_type_dummy:room_typeHotel room:re~   475.      433.       1.10  2.72e- 1
## 15 stay_type_dummy:room_typePrivate room:~   -16.8       5.11    -3.29  9.98e- 4
## 16 stay_type_dummy:room_typeShared room:r~   -53.4      24.9     -2.15  3.19e- 2
```




Tokyo
Entire home/apt
Hotel room
Private room
Shared room
price
1e+05
5e+04
0e+00
Long−stay
Short−stay
stay_type


London
Entire home/apt
Hotel room
Private room
Shared room
price
1000
500
0
Long−stay
Short−stay
stay_type