# Analysis of Golden State Warriors Ticket Pricing

*NBA Future Analytics Stars Capstone Project*

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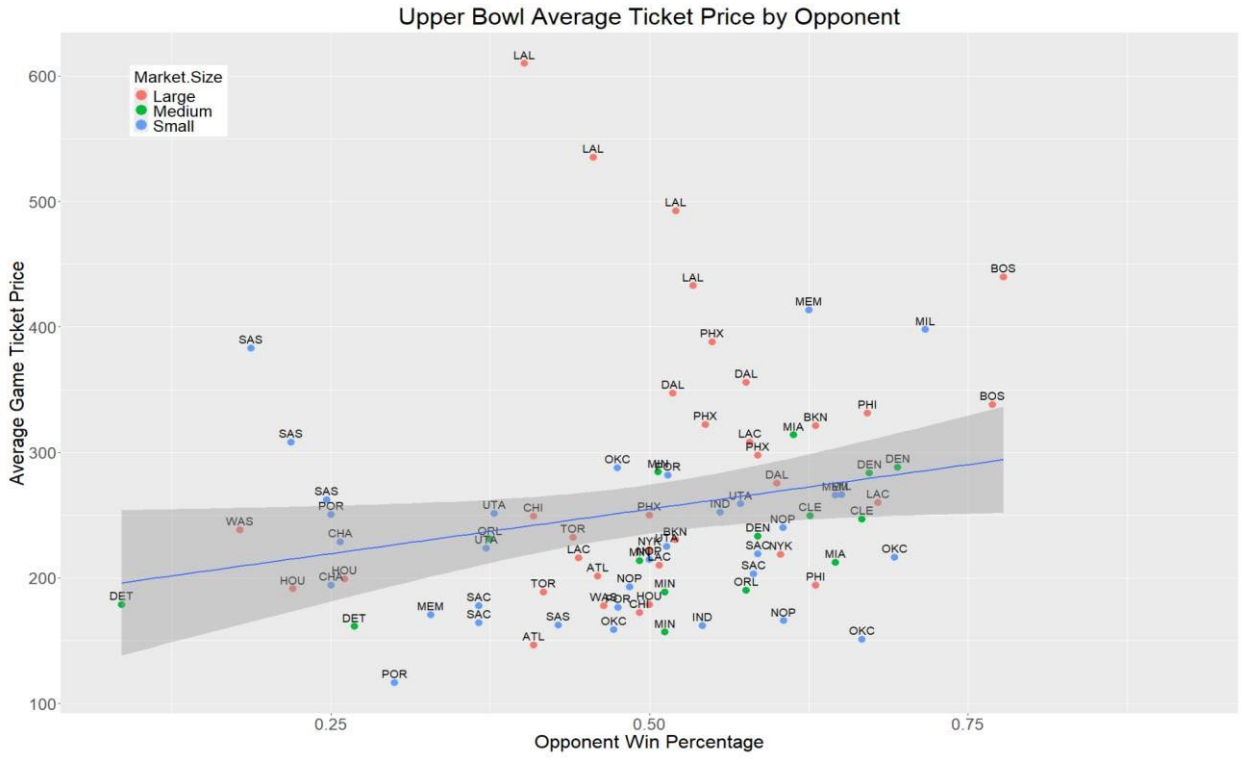
# External Game Factors

**Opposing Team Factors:**

It would be expected that the opposing team has a significant impact on ticket prices. This could be due to various factors such as performance, star players, or where their fans are located. The measures I will use for this are opponent market size (based on MSA population) and opponent win percentage. These specific market size groupings come from Hoop Social. For the first 5 home games each season, opponent win percentage will be that teams win percentage the previous year. After these games, this number will be their current win percentage on the year. The following graph showcases the relationship between opponent win percentage and ticket price for each game, with the opposing team and market size included as well.




We can see the positive relationship between opponent win percentage and ticket price. Large market teams also appear to generally have higher ticket prices. The Lakers stand out as a massive outlier: all 3 games with the highest average ticket price are the Lakers and the other Lakers game in this data is just behind at the fifth largest. Some other teams such as the Celtics, Mavericks and Spurs also stand out as games where ticket sales were pretty good, but no team comes close to the average prices of when the Lakers visit.

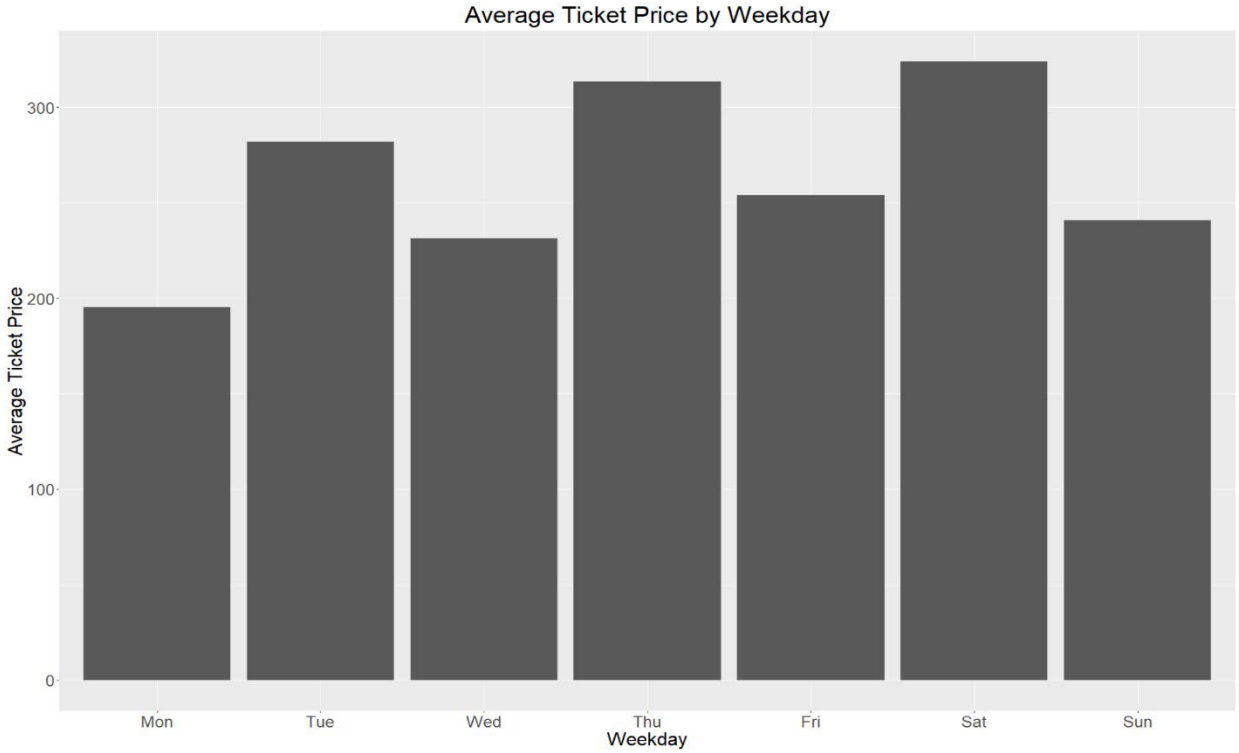
**Star Player Impact:**

The obvious star player for the warriors in recent time has been Steph curry. It would certainly be expected that ticket prices fall when it is known he is not playing. You can see in these tables that the average ticket price was notably lower in both seasons when Curry did not play. He did not miss many games in 2023, but given that he missed just over a third of the 2022 season this roughly $30 drop off in average ticket price seems meaningful.

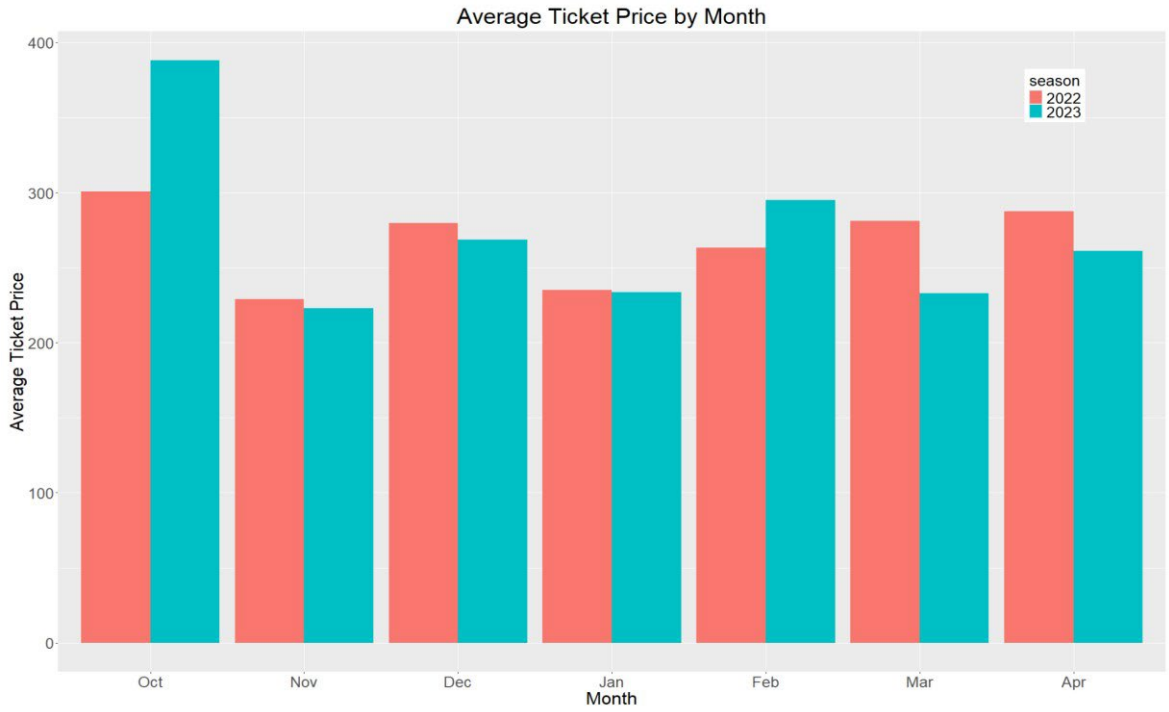
| 2022 | | |
|---|---|---|
| Curry | Games | Avg Price |
| Played | 26 | 275.39 |
| Out | 15 | 244.12 |

| 2023 | | |
|---|---|---|
| Curry | Games | Avg Price |
| Played | 36 | 254.41 |
| Out | 5 | 217.98 |

**Weekday, Month and Year**

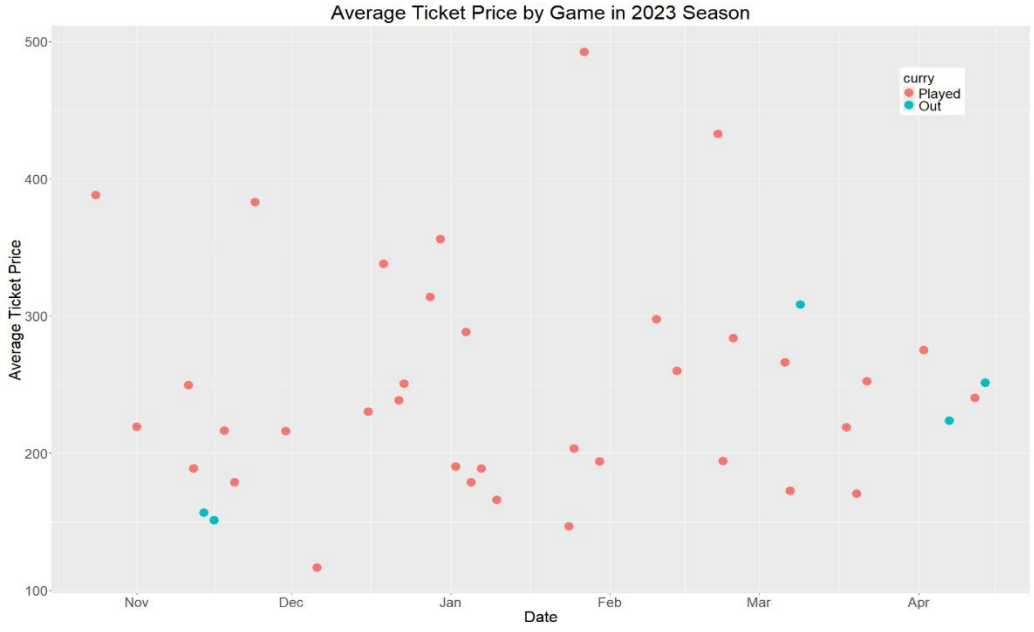



While there are differences in weekdays on this graph, it is difficult to draw conclusions from this. Saturday has the highest average price, which makes sense, but the average ticket prices on Saturday and Sunday are not that high so there is no clear weekend effect. While there is not much of a trend here, there are some differences in the average price on day and the day of the week may be worth considering when modeling.

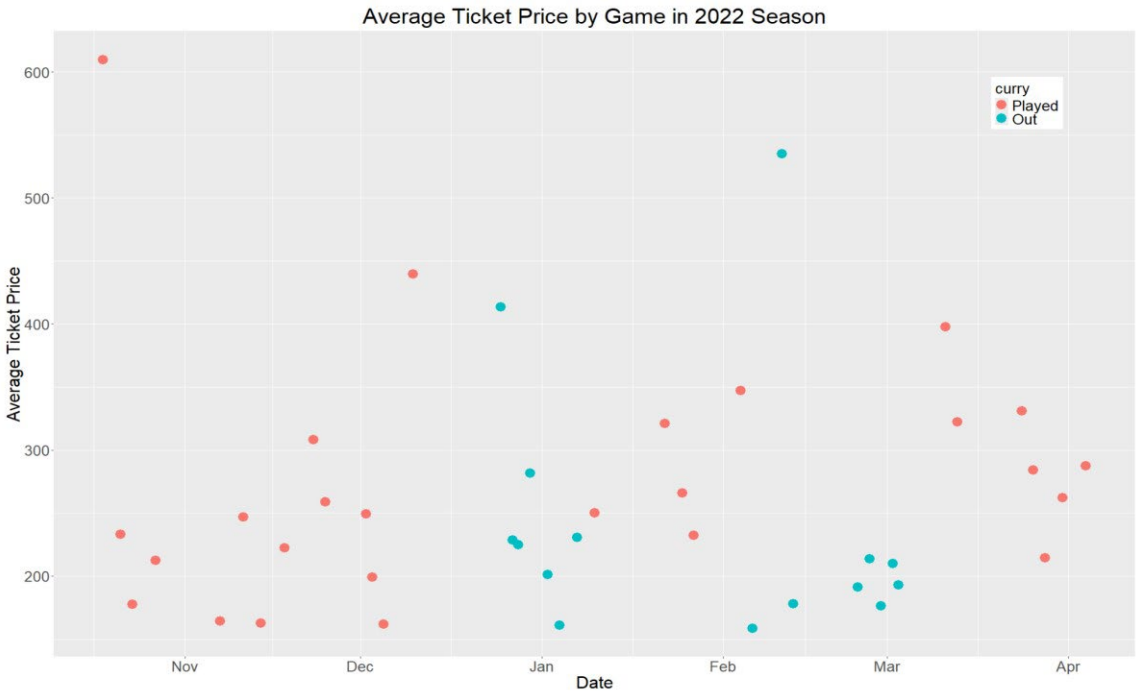



| Season | Avg Price |
|---|---|
| 2022 | 264.0682 |
| 2023 | 251.3861 |

Average ticket price was slightly higher in the 2022 season. Note that there was only one home game in October of 2022 and April of the 2023 season, so these columns are just the average price of that game. The average price seems to move around by month, and there is no clear trend for either year. The main difference between the two seasons is that the average ticket price rose at the end of the 2022 season, whereas it dropped at the end of the 2023 season.




Due to Steph Curry only missing 5 games in 2023 it is difficult to gauge his impact. However, we can see that the two games he missed early in the season had abnormally low attendance. We can also see the ticket prices fall at the end of the season where Curry missed two games, so this could have been some of the reason for this.




Steph Curry's impact on ticket prices was much more apparent in 2022. There were two periods of multiple missed games due to injury, and ticket prices were very low during both. You can see the ticket prices fall in January when he got injured, and they bounced back when he came back. This was even more noticeable when he got injured in February. Average ticket price quickly fell to extremely low levels, and average prices skyrocketed right when he returned.

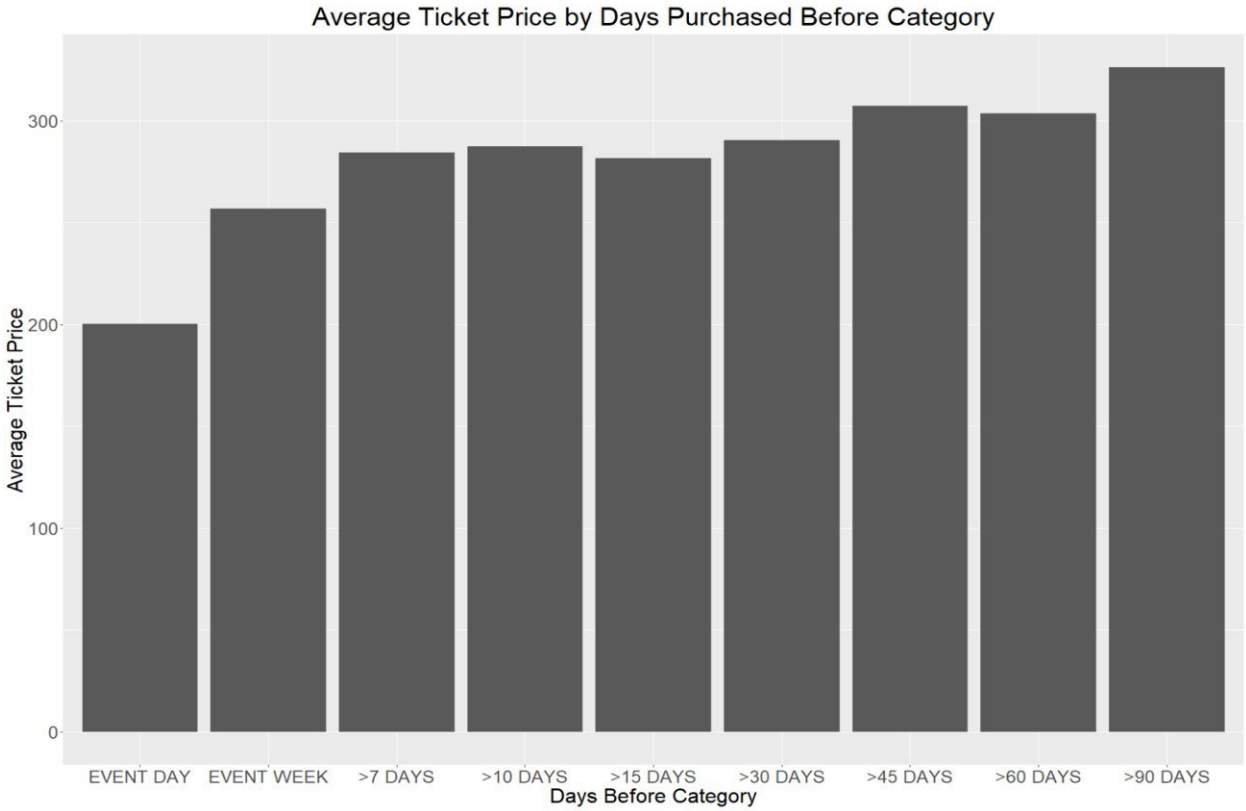
**Game Time:**

| Time | Freq | Avg Price |
|---|---|---|
| 12:30:00 | 1 | 251.29 |
| 16:00:00 | 1 | 283.65 |
| 16:30:00 | 1 | 213.71 |
| 17:00:00 | 1 | 413.48 |
| 17:30:00 | 21 | 297.78 |
| 19:00:00 | 57 | 240.56 |

Games were played at 6 different times: 12:30 PM, 4:00 PM, 4:30 PM, 5:00 PM, 5:30 PM and 7:00 PM. Only 1 game was played at each of the four earlier times and most of the games were played at 7 PM. Tickets for 5:30 games were just under $60 cheaper than 7:00 tickets on average. For modeling purposes, we will group all the games before 7:00 PM into an Early variable. The average of this new variable is about $1.50 higher than the average ticket price of the 5:30 games.

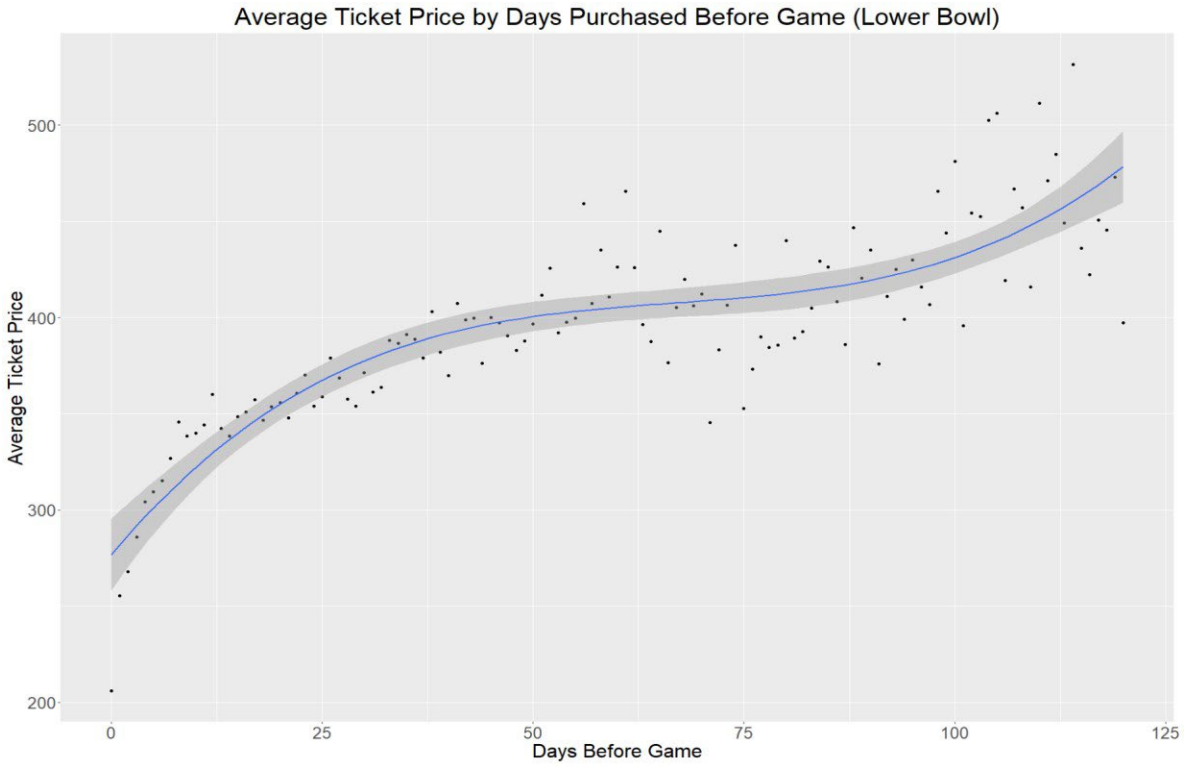
| Time | Freq | Avg Price |
|---|---|---|
| 7:00 | 57 | 240.56 |
| Early | 25 | 299.17 |

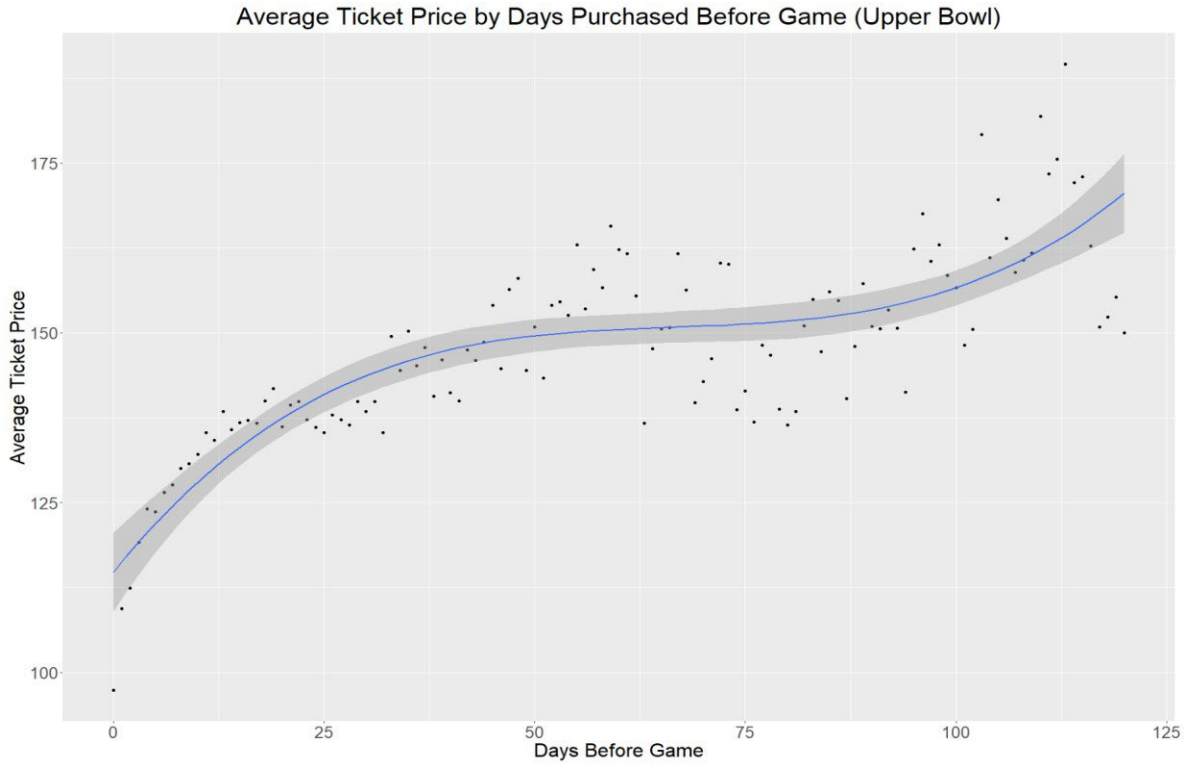
**Time of Purchase:**




| New Days | Avg Price |
|---|---|
| EVENT DAY | 200.15 |
| EVENT WEEK | 256.86 |
| >7 DAYS | 285.33 |
| >45 DAYS | 309.54 |

Tickets are generally cheaper the closer they are purchased to the game. You can see in the graph above that there is a very sharp drop in average price of tickets that are purchased on game day. Ticket prices increase as you move further from game day, and this seems to start leveling out after about a week. They begin to increase more as you get very far away from the event, about 45 days or so. The table on the left shows a simplified grouping of these categories to be considered when modeling.



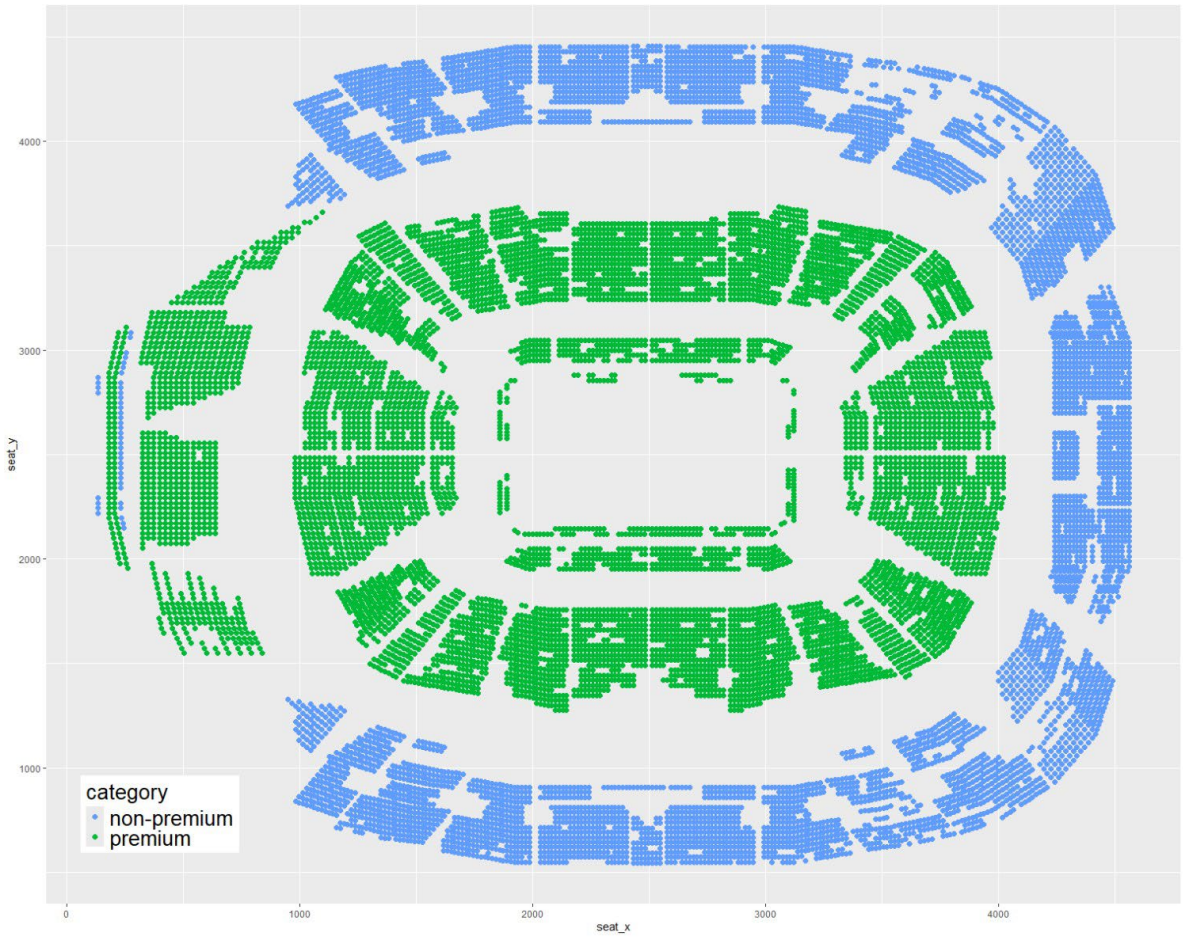

Looking more specifically at the purchase time, we can see what appears to be a third-degree polynomial trend for both upper bowl and lower bowl seats. Days purchased away from game certainly seems like it

will be a helpful predictor when modeling, and both the categorical version of it and as a numeric variable will be considered.

## Stadium areas & Sections

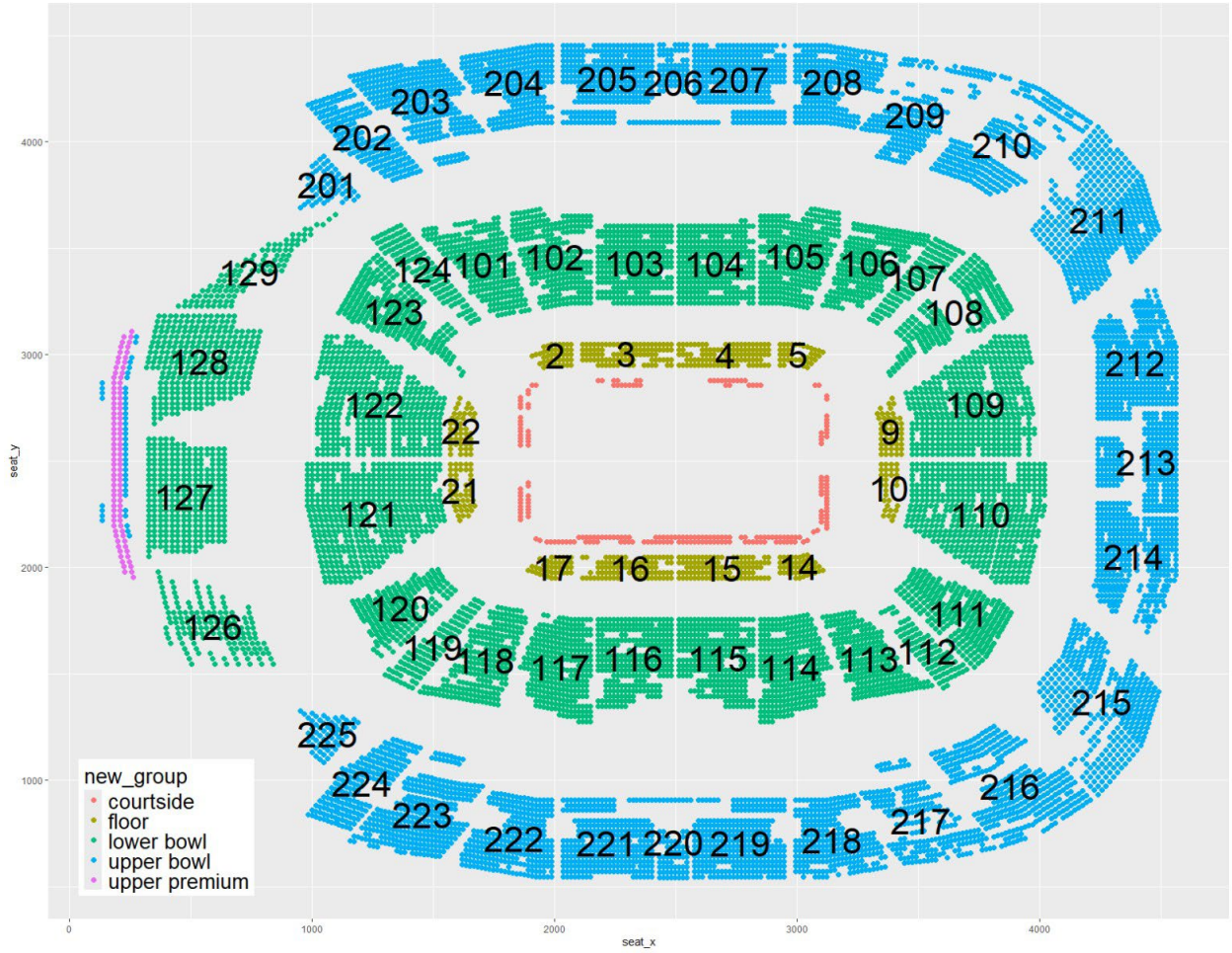
The provided data gave 3 different section groupings (group, level & category). The following graphs show all seat coordinates in each of the pre-specified sections:





The top two graphs are very similar: the only difference is that group (the graph on the right) includes the floor seats not directly next to the court as courtside whereas level (the graph on the left) classifies these floor seats as lower bowl. Category (the graph on the bottom) essentially classifies all lower bowl and court seats as premium whereas upper bowl seats are non-premium. The only exception to this is a few upper bowl seats on the left are classified as premium.

In total we can use these groupings to create 5 new stadium groupings. The seats that are courtside in group but lower bowl in level will be called floor seats. There can also be another grouping made for the upper bowl seats that are premium. The following graph shows these new groupings along with the individual section numbers.

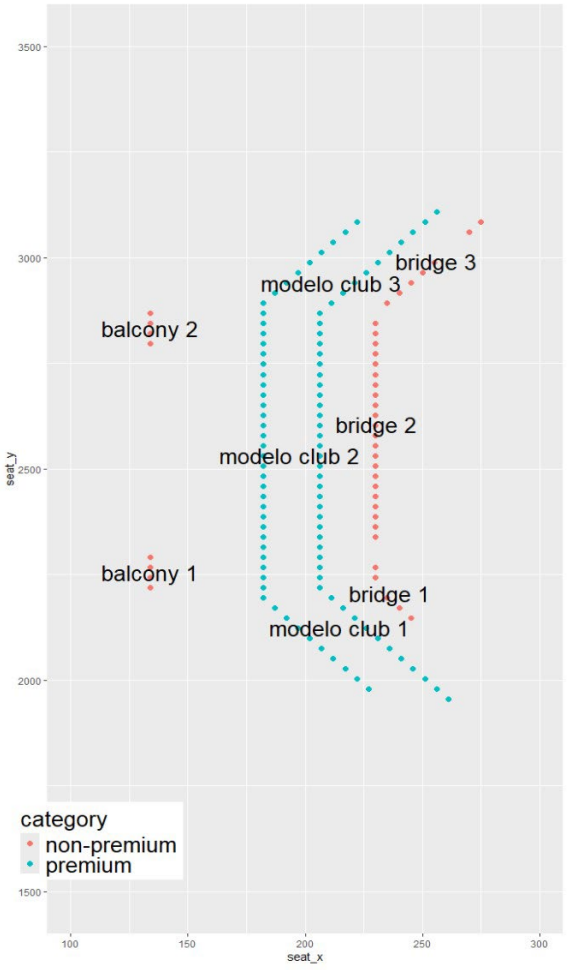


| New Group | Avg Price |
|---|---|
| courtside | 2323.12 |
| floor | 979.02 |
| lower bowl | 300.29 |
| upper bowl | 125.44 |
| upper premium | 150.91 |

As expected, the average courtside tickets are extremely expensive with large drop-offs with floor and lower bowl tickets. The average lower bowl ticket is worth roughly twice the price of an upper bowl premium ticket, and non-premium lower bowl tickets are on average about $25 less than these.

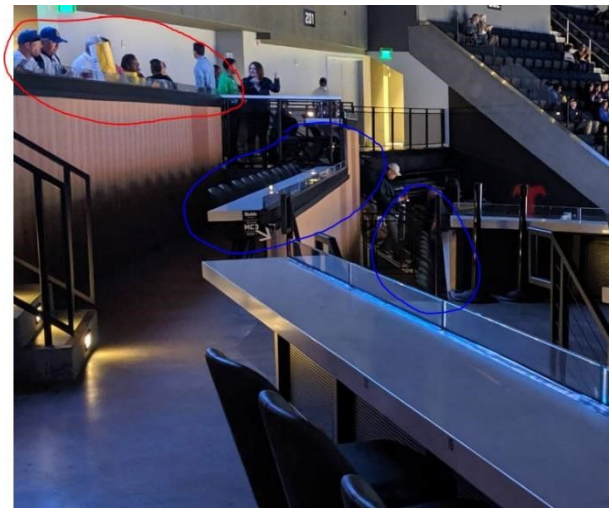
Looking at the sections online, we can break these down into further groupings. Sections 101-106 as well as 113-118 are sideline club tickets and sections 126-129 are Pepsi club tickets. These will each be split into their own group, and the rest of the lower bowl will be classified as general 100 level.

The upper bowl becomes somewhat more interesting. The area on the left of the seats graph (behind the Pepsi club) are all bridge seats. These can be split into 3 groups. The ones currently classified as premium are Modelo Club seats and the non-premium seats here are classified as either a bridge or balcony section.

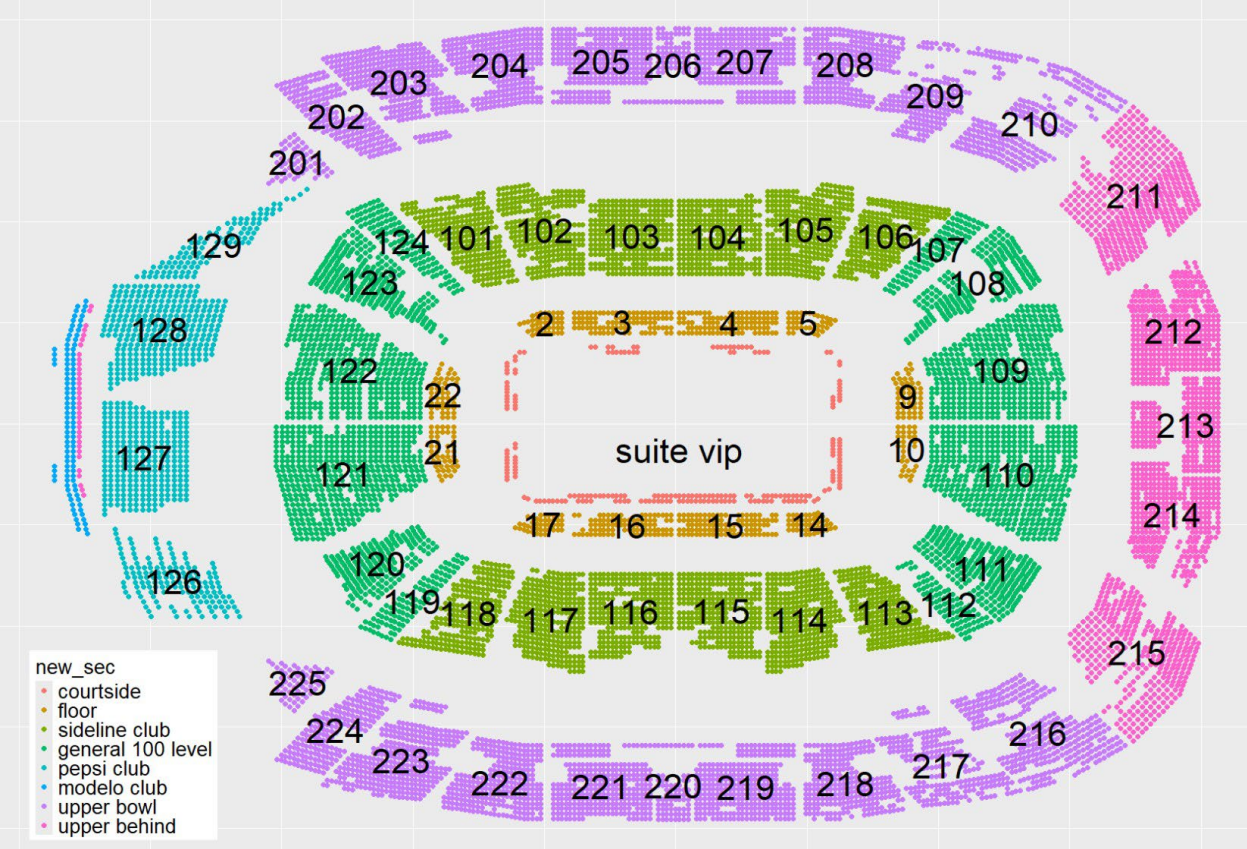



| Section | Freq | Avg Price |
|---|---|---|
| modelo club | 426 | 150.91 |
| balcony | 159 | 182.30 |
| bridge | 43 | 116.60 |

While the balcony seats are not classified as premium in this dataset, they do appear to be premium seats. They have the highest average price out of the bridge seats, although this sample size is small. According to rateyourseats, “All of these seats have access to the Modelo Cantina bar and food options exclusive to this level of seating.” You can see in the pictures below that there are 2 rows of seats at a table with the balcony seats directly behind and connected to these. Grouping both the modelo club and balcony sections into modelo club seems to make the most sense as they really are the same section. There are only 43 remaining bridge seats. The average price of these seats is very close to the upper bowl tickets, so these will be grouped with those.

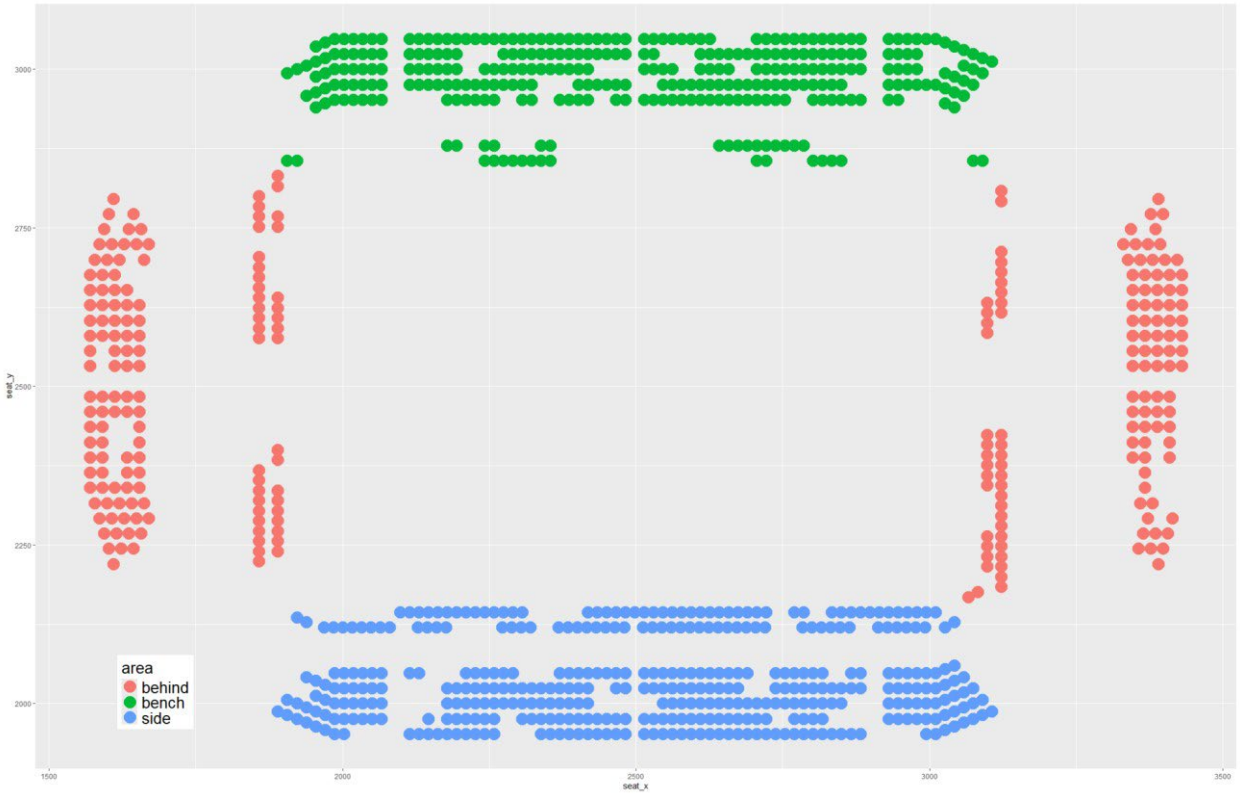



The following graph shows these new stadium groupings with the addition of club sections. Upper Bowl has also been split into whether the seat is to the side of the court or behind the basket.




| new_sec | avg |
|---|---|
| courtside | 2323.1214 |
| floor | 979.0167 |
| sideline club | 395.1206 |
| general 100 level | 240.2351 |
| pepsi club | 159.4844 |
| modelo club | 159.4393 |
| upper bowl | 128.5755 |
| upper behind | 112.3125 |

Including the different clubs improves the section groupings. The sideline club seats, which have a better view and club access, are now worth around $150 more than the general 100 seats. The average price of the Pepsi clubs is lower than general 100 seats. These seats have access to a reserved club, but they also are further back so the view is not as good. The average price of the Modelo lub seats are roughly the same as the Pepsi club. Neither of these sections have a great view, so the difference between these and general upper bowl seats is a premium on the club access. The upper behind seats are worth about $15 less than the other upper bowl seats on average.

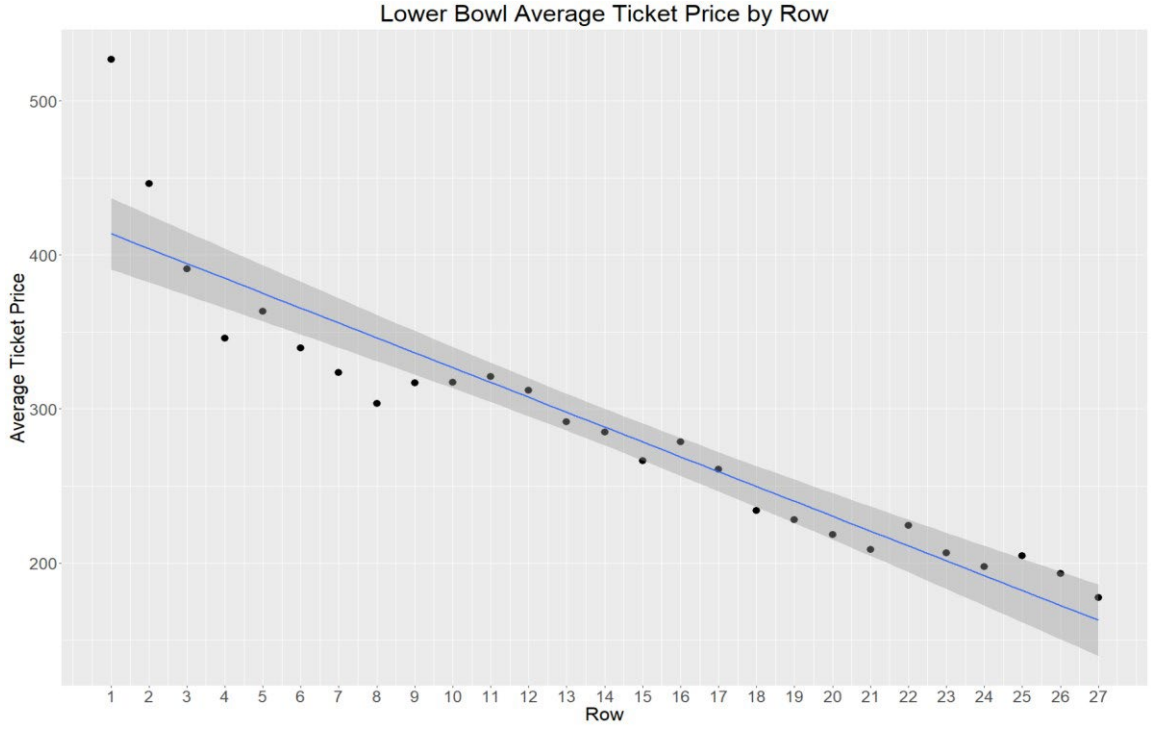


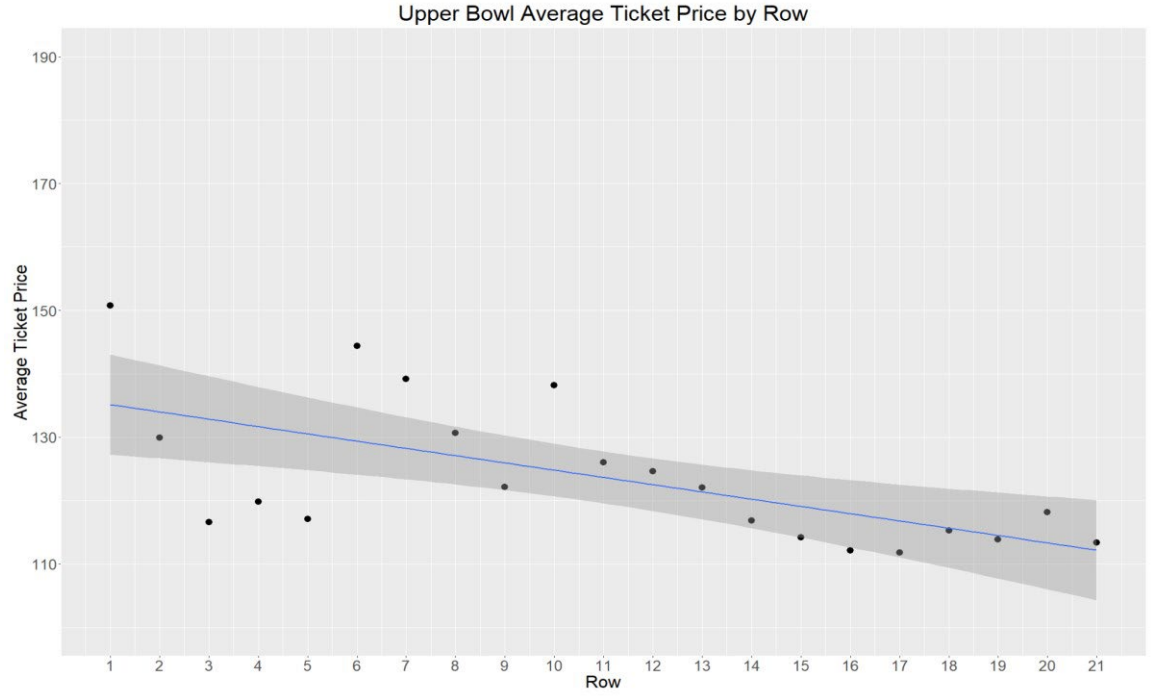

| Area | Avg Price |
|---|---|
| behind | 970.132 |
| bench | 1276.353 |
| side | 1250.883 |

The floor (including courtside) was manually split up into three sections based on where the seats are located. Anything behind the basket is grouped into behind whereas the rest of the seats are split into side or bench depending on whether they are on the same side as the players' benches. Side and bench are similar, but due to there being less seats available as well as the potential to sit closer to the players it is expected that the bench seats will be the most expensive.

# Seat Features

Now that we have looked at external game factors as well as sections, the final consideration for modeling will be the individual seat features. The following graphs showcase the average ticket prices

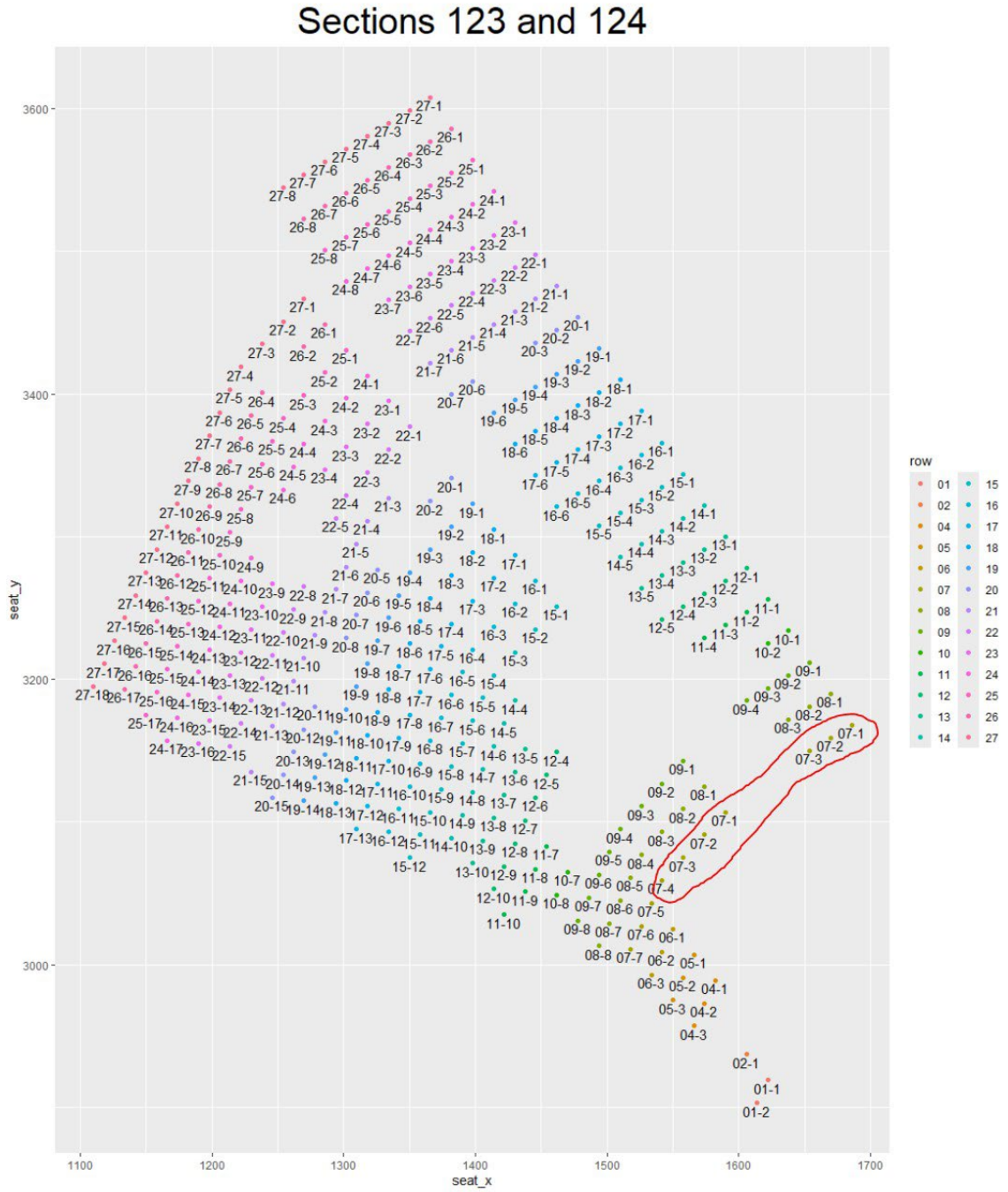



The linear trend appears pretty strong for the lower bowl. There is a significant increase in row 1 ticket prices in both. In rows 6 and 10 in particular the Upper Bowl average ticket prices increase.

**Front Row Views:**

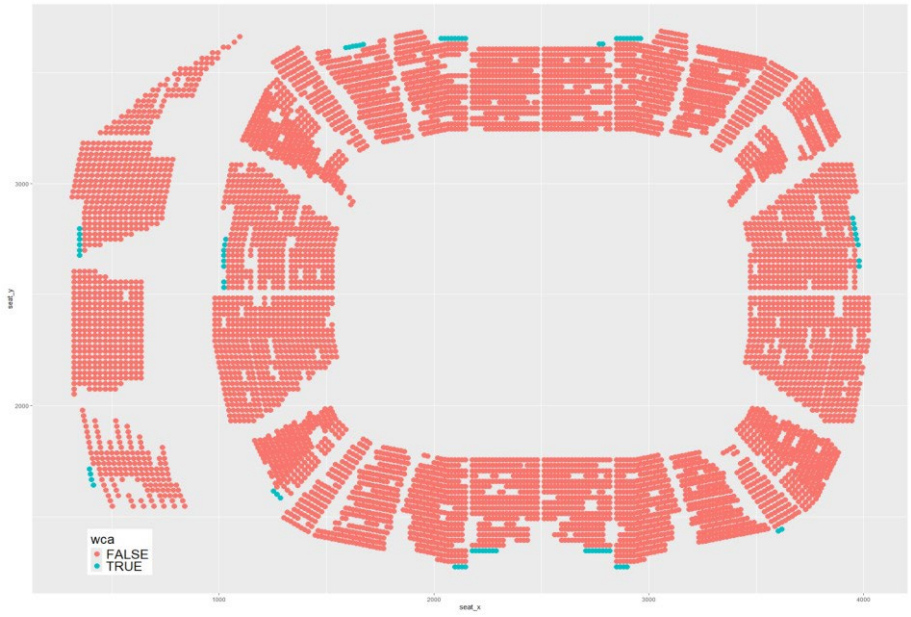
There are many seats in the arena that provide a front row view, but are not actually row 1 seats (especially in the upper bowl). The graph below showcases an example of this. You can see that some of the row 7 seats are location over the exit tunnel, so there are no rows in front of these seats.




To account for these seats, I looked through a graph like the one above for each section where there appeared to be front row views. Any seat with no rows in front of it was marked as a front frow view (frv) and this variable will be considered in the models.

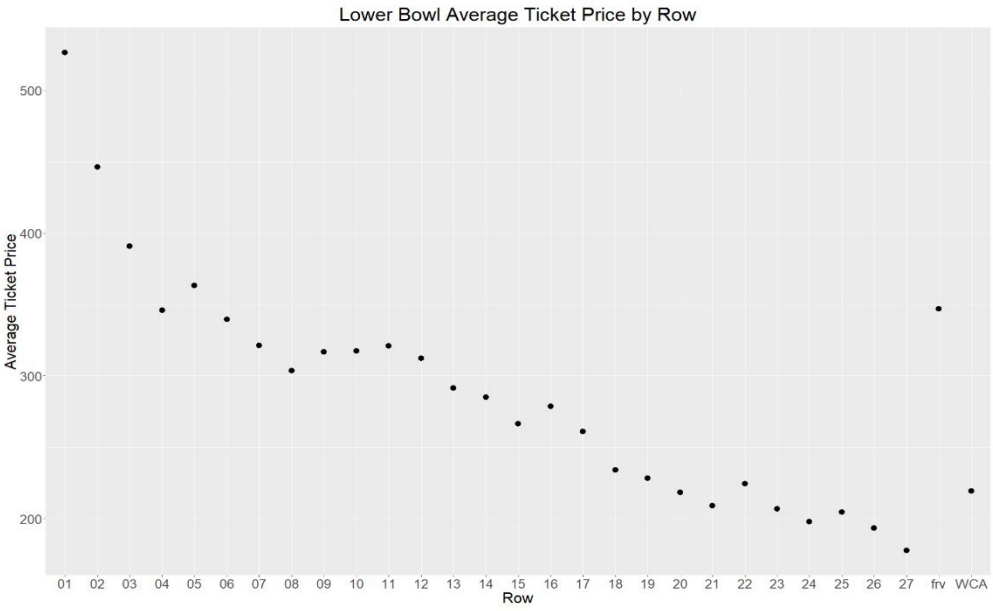
**Wheelchair Access:**

There are some seats in the data that are wheelchair access seats. These seats do not have a row number in the data: the row is listed as WCA. These wheelchair access sections are setup differently in some areas of the arena. The following graph and image show a map of these sections as well as the view from one of them in the lower bowl.



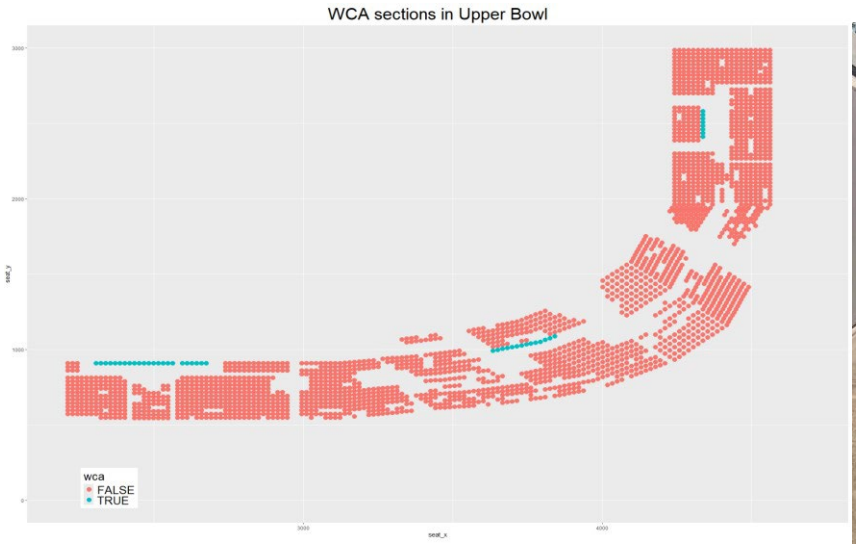


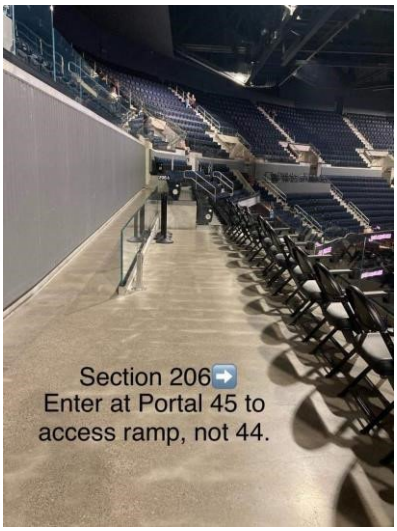
All these wheelchair access sections in the lower bowl are located at the back of the sections. They are all located behind a group of 17-21 seats. A row number needs to be assigned to these for modeling purposes, so I will make the row number for each of these sections in the lower bowl 19.

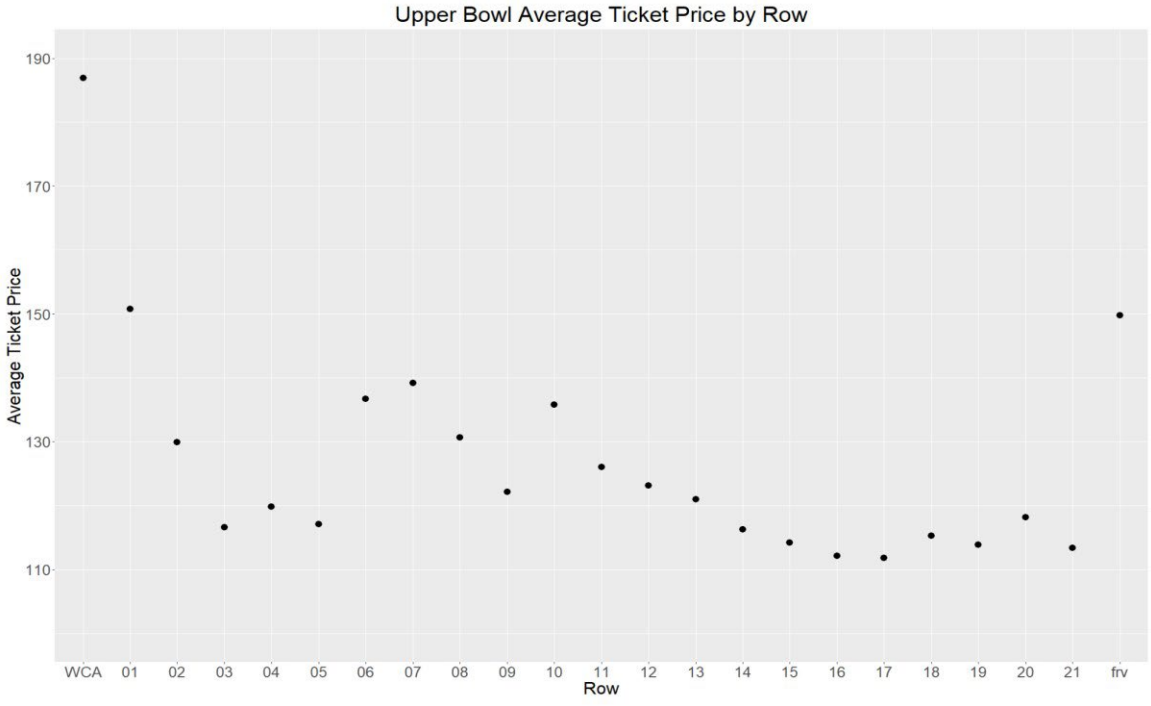



Splitting out the front row view seats seems to be a better representation of seat quality. Most of these seats were rows 7 or 10, and the average price of the frv seats is higher than these. The wheelchair access seats in the lower bowl are also not that expensive and priced around the same as the general seats towards the back rows.

The wheelchair access sections in the upper bowl are a different situation. These sections are setup in front of most of the rows. Depending on the section these WCA areas are either all the way in front of a section or an overlook in the middle of a section, raised above the seats in front of them. Relative to the rest of the seats in the upper bowl, these seats are good seats that have a better view than the seats around them.




The quality of these wheelchair access seats in the upper bowl can be seen with the prices. On average, these are worth just over $35 more than row 1 seats in the upper bowl. Additionally, the front row view seats not in the front look to matter more in the upper bowl. The average price of these is almost the same as row 1 seats in the upper bowl. The front row view likely matters more up here because the increased

distance from the court is less meaningful in the upper bowl, so these are very similar to row 1 seats up here.

The final seat variable examined in the models will be the angle of the view. To do this, I calculated how far off center each seat is based on the x, y coordinates of the seat. For seats to the side of the court, the x distance from the center will be considered. For seats behind the basket, the y off-center will be used. Both will be scaled so the furthest seat to the side is 100% off-center. These calculations will be done separately for the bowl and floor data.

# Modeling

### Lower Bowl Model

In the initial model created, weekday was used as a variable. This had an interesting impact, and even though average game prices were not higher on Friday the model predicted Friday tickets to be worth the most, around the same as Saturday. Tuesday tickets also have a similar intercept which is interesting, but I do not have a great explanation for this. Due to Friday's and Saturday's having a higher intercept and the fact that it would make sense that these are worth more, I created a new variable called weekend which is true if the game was on a Friday or Saturday.

| | |
|---|---|
| WeekdayTue | 61.251*** |
| | (0.928) |
| WeekdayWed | 34.049*** |
| | (0.972) |
| WeekdayThu | -3.696*** |
| | (1.257) |
| WeekdayFri | 64.431*** |
| | (0.851) |
| WeekdaySat | 60.528*** |
| | (1.143) |
| WeekdaySun | 12.729*** |
| | (1.047) |

| | *Dependent variable:* |
|---|---|
| | price |
| win_pct | 170.136*** |
| | (1.798) |
| big_market | 18.897*** |
| | (0.554) |
| LALOther | -297.484*** |
| | (1.222) |
| curry | 15.536*** |
| | (0.640) |
| weekend | 40.774*** |
| | (0.562) |
| new_timeEarly | 36.720*** |
| | (0.594) |
| new_daysEVENT WEEK | 74.100*** |
| | (0.687) |
| new_days> 7 DAYS | 146.132*** |
| | (0.669) |
| new_days> 45 DAYS | 189.015*** |
| | (0.869) |
| new_secgeneral 100 level | -278.032*** |
| | (1.073) |
| new_secpepsi club | -335.091*** |
| | (1.842) |
| seat_offcenter | -446.519*** |
| | (2.583) |
| row | -5.930*** |
| | (0.048) |
| row1 | 102.151*** |
| | (1.452) |
| frv | 50.940*** |
| | (3.831) |
| wca | -25.098*** |
| | (3.897) |
| new_secgeneral 100 level:seat_offcenter | 556.085*** |
| | (3.355) |
| new_secpepsi club:seat_offcenter | 407.927*** |
| | (5.188) |
| Constant | 636.000*** |
| | (1.792) |
| Observations | 222,718 |
| $R^2$ | 0.623 |
| Adjusted $R^2$ | 0.623 |
| Residual Std. Error | 121.541 (df = 222699) |
| F Statistic | 20,418.900*** (df = 18; 222699) |
| *Note:* | *p<0.1; **p<0.05; ***p<0.01 |

All the model coefficients line up with the initial analysis. The impact of playing the lakers is massive, and you can see the model predicts lower bowl tickets to be around $300 more expensive when playing the Lakers. It is predicted that when Steph Curry plays these tickets go up by just over $15. The weekend impact is about 2/3 the size of the initial Friday and Saturday coefficients, and these tickets are predicted to be worth $40 more than weekdays.

Purchase days out as a numeric variable was considered, but these category groupings. seem to do a better job. A third-degree polynomial was considered for the numeric data, and while this added predictive power it seemed to overfit the model.

The base section in this model is sideline club. General 100 level and Pepsi club tickets are predicted to be worth much less than these. There was also an interaction effect included for off-center and the section grouping. The off-center coefficient is very negative, and the interaction terms for 100 level and Pepsi club are positive. This makes sense, as how far off center you are would be much more important to the side of the court than behind the basket. General 100 tickets are predicted to be slightly more expensive more to the side. The view is almost unchanged further to the side, but many of these seats are above the exit tunnels which means less rows in front of you so this makes sense.

Row 1 tickets have an estimated about $100 premium, whereas non front row seats with a front row view seem to be worth about $50 more than the tickets around them. As expected, wheelchair access seats appear to be worth less in the lower bowl.

**Upper Bowl Model**

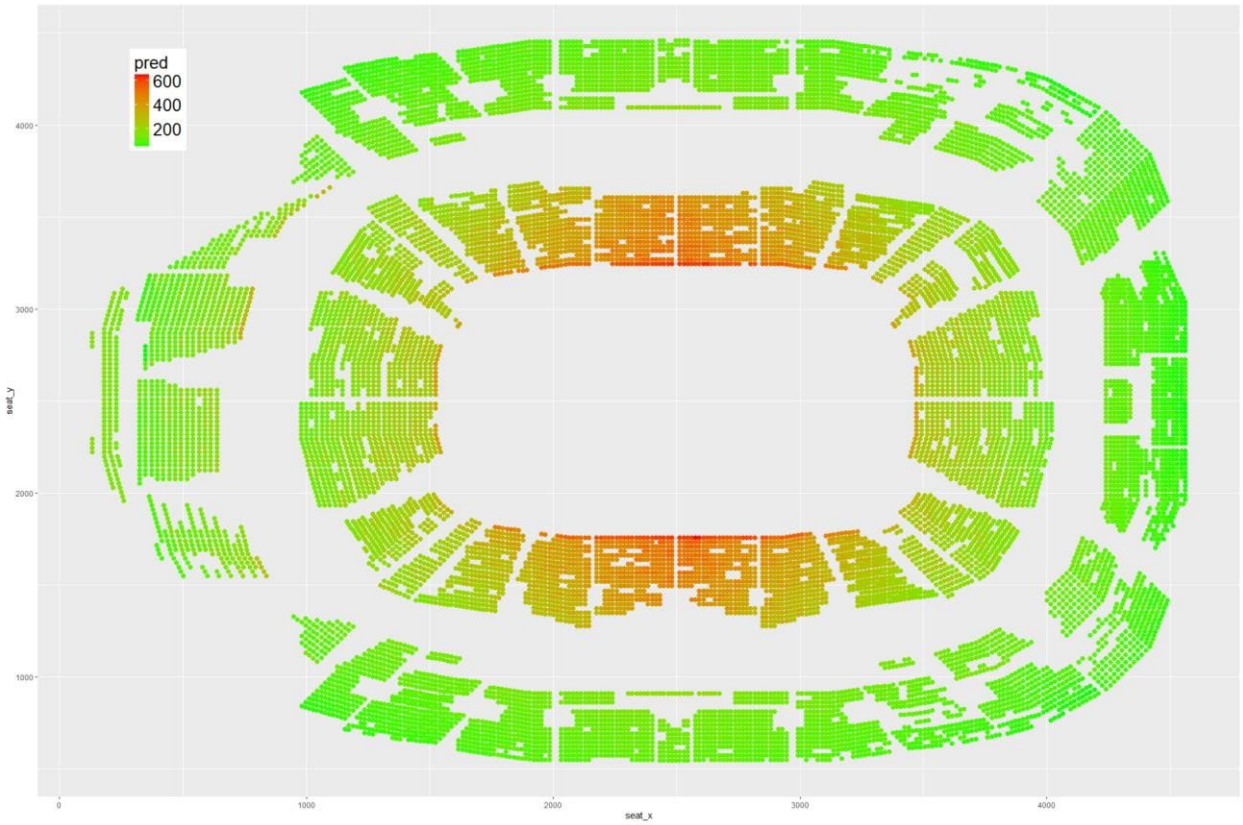
| | *Dependent variable:* |
|---|---|
| | price |
| win_pct | 63.797*** |
| | (0.678) |
| big_market | 7.804*** |
| | (0.207) |
| LALOther | -143.917*** |
| | (0.460) |
| curry | 5.886*** |
| | (0.241) |
| weekend | 15.923*** |
| | (0.211) |
| new_timeEarly | 16.659*** |
| | (0.224) |
| new_daysEVENT WEEK | 21.171*** |
| | (0.275) |
| new_days> 7 DAYS | 39.607*** |
| | (0.258) |
| new_days> 45 DAYS | 53.276*** |
| | (0.318) |
| new_secupper bowl | 5.034*** |
| | (1.875) |
| new_secupper behind | -15.372*** |
| | (1.878) |
| seat_offcenter | -41.143*** |
| | (0.403) |
| row | -2.183*** |
| | (0.021) |
| row1 | 11.441*** |
| | (0.567) |
| frv | 15.722*** |
| | (0.502) |
| wca | 26.623*** |
| | (0.795) |
| Constant | 222.494*** |
| | (1.968) |
| Observations | 211,335 |
| $R^2$ | 0.510 |
| Adjusted $R^2$ | 0.510 |
| Residual Std. Error | 44.371 (df = 211318) |
| F Statistic | 13,747.940*** (df = 16; 211318) |
| *Note:* | *p<0.1; **p<0.05; ***p<0.01 |

The upper bowl model tells a similar story to the lower bowl model. All the external game factors have a roughly similar impact here. Upper Bowl seats are predicted to be the highest, with an intercept about $5 higher than the Modelo club seats. However, the Modelo Club seats will still be predicted higher than upper bowl seats that are not row 1. Upper behind seats have an intercept about $20 less than regular upper bowl seats.

An interaction effect was considered for off-center and section, but I ended up removing this. With the interaction effect seats more towards the side were predicted slightly higher for upper behind seats. While the off-center impact increased for the seats on the side, it does not make much sense to predict the upper behind seats in the corner to be worth more than in the middle.

The row 1 impact is not nearly as large as the lower bowl model. In fact, the non-row 1 seats marked as front row views have a higher intercept than these. Because these are generally row 7 or 10 seats, however, this is just cancelling out the penalty for going back a few rows. Also, unlike the lower bowl wheelchair access seats are predicted to be worth more in this model. Given the differences between these examined earlier we would expect these seats to be worth relatively more in the upper bowl.

The following graph shows the predicted prices for upper bowl and lower bowl seats (predicted price is the color with red seats being more expensive. These predictions were calculated for  a big market opponent (not the Lakers) with a 0.5 win percentage in a game that Curry played in on a weekday at 7:00 PM. Ticket purchase time was also set to event week.




**Courtside Model:**

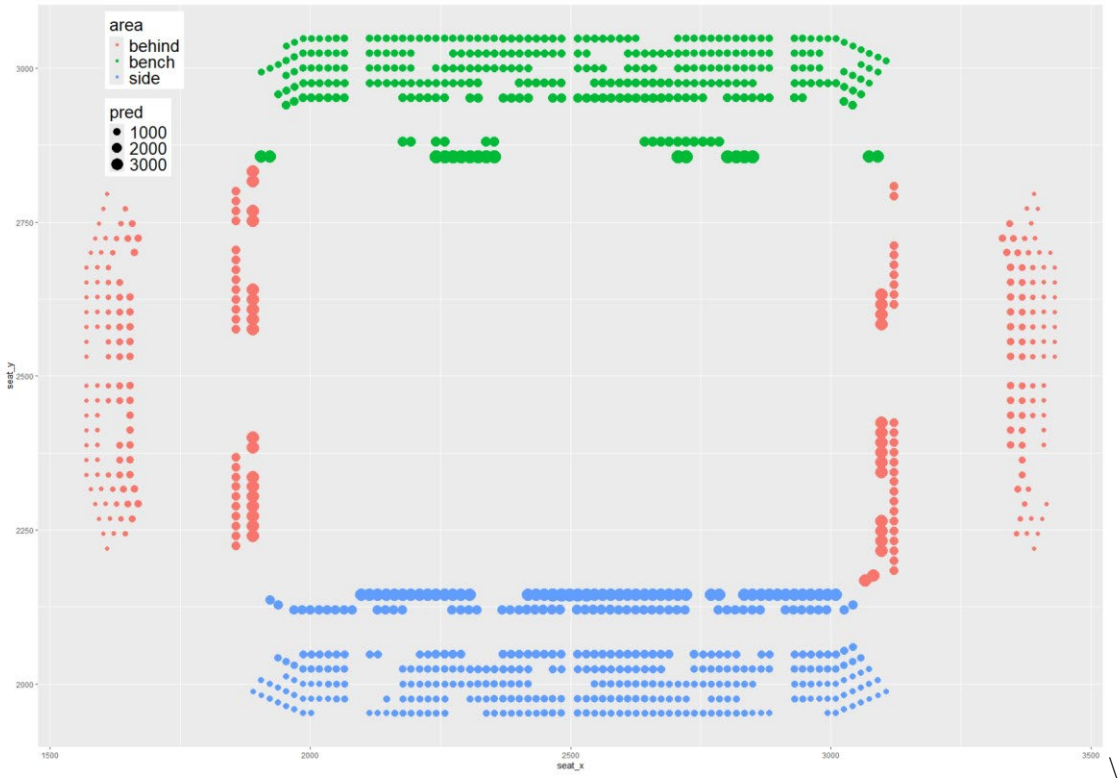
| | *Dependent variable:* |
|---|---|
| | price |
| win_pct | 676.637*** |
| | (31.577) |
| big_market | 88.578*** |
| | (9.771) |
| LALOther | -1,290.545*** |
| | (23.062) |
| curry | 91.878*** |
| | (11.467) |
| weekend | 129.482*** |
| | (9.944) |
| new_timeEarly | 102.978*** |
| | (10.554) |
| new_daysEVENT WEEK | 329.878*** |
| | (11.062) |
| new_days> 7 DAYS | 795.957*** |
| | (12.346) |
| new_days> 45 DAYS | 918.972*** |
| | (18.075) |
| rowA2 | -166.083*** |
| | (14.459) |
| rowA3 | -251.332*** |
| | (16.650) |
| rowA4 | -296.933*** |
| | (15.247) |
| rowA5 | -294.431*** |
| | (15.805) |
| rowAA | 2,392.604*** |
| | (22.157) |
| rowBB | 593.320*** |
| | (18.729) |
| off_pct | -57.575 |
| | (58.830) |
| areabench | 575.662*** |
| | (23.562) |
| areaside | 417.035*** |
| | (22.903) |
| off_pct:areabench | -411.230*** |
| | (72.654) |
| off_pct:areaside | -399.475*** |
| | (71.006) |
| Constant | 1,265.482*** |
| | (34.138) |
| Observations | 20,123 |
| $R^2$ | 0.597 |
| Adjusted $R^2$ | 0.597 |
| Residual Std. Error | 647.339 (df = 20102) |
| F Statistic | 1,488.429*** (df = 20; 20102) |
| *Note:* | *p<0.1; **p<0.05; ***p<0.01 |

The external game factors still tell a pretty similar story in the courtside model. The impact of the Lakers is massive, and you can see that predicted ticket prices are over $1000 higher when playing the Lakers.

The coefficients for the rows make sense. All row coefficients are relative to row A1 (the first row in the second grouping of seats). Row AA seats are predicted to be worth over $2,000 more than these. Each of the rows behind A1 are worth less and the drop in ticket prices is decreasing.

As predicted, the seats in the bench area are worth the most. The intercept for these is about $150 more than seats in the side section. Seats behind the basket are predicted to be around $500 less than these. An interaction between area and off-center was also included, and you can see that the impact of being off-center is almost the same in the bench and side areas while it is not very impactful for behind seats. This makes sense, as your view is not really worsened when moving closer to the side in the behind seats.

The following visual shows the predicted ticket price for the individual courtside seats. The external factors for these predictions were the same as the ones used for the upper bowl & lower bowl predictions.


area
behind
bench
side
pred
1000
2000
3000
seat_y
3000
2750
2500
2250
2000
1500
2000
2500
3000
3500
seat_x

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