

Mario Kart Wii

By Eli, Milton, Nickels, and Xavier





The Problem

If you have a physical copy of a popular video game and wish to sell that copy on an online bidding website, what can you do to improve your chances of people bidding highly on your item?

What factors go into how people bid on items on eBay, and how can our understanding of those factors help us increase the selling prices of items we list on the site?



The Dataset



To try and answer this question, we looked at a dataset of eBay auctions that sold physical copies of the video game Mario Kart, made for the Nintendo Wii.

For context, Mario Kart Wii came out in 2008, as the sixth installment of the incredibly popular Mario Kart series, as one of the big selling games of the Nintendo Wii, one of the best selling video game consoles of all time.

The website eBay is a popular e-commerce website, that allows for peer to peer buying and selling of physical items. Most items on eBay are sold via auction, where an initial price is posted and other users can bid.



The Variables



Id (Categorical, nominal): Auction ID assigned by Ebay.

Duration (Numerical, discrete): Auction length, in days.

n_bids (Numerical, discrete): Number of bids.

Cond (Categorical, nominal): Game condition, either new or used.

Start_pr (Numerical, continuous): Start price of the auction.

Ship_pr (Numerical, continuous): Shipping price.

Total_pr (Numerical, continuous): Total price, which equals the auction price plus the shipping price.

Ship_sp (Categorical, nominal): Shipping speed or method.

Seller_rate (Numerical, discrete): The seller's rating on Ebay. This is the number of positive ratings minus the number of negative ratings for the seller.

Stock_photo (Categorical, nominal): Whether the auction feature photo was a stock photo or not. If the picture was used in many auctions, then it was called a stock photo.

Wheels (Numerical, discrete): Number of Wii wheels included in the auction. These are steering wheel attachments to make it seem as though you are actually driving in the game. When used with the controller, turning the wheel actually causes the character on screen to turn.

Title (Categorical, nominal): The title of the auctions.



The Question

Does the bidding start price on a copy of Mario Kart significantly affect the total/end price of the purchased items?

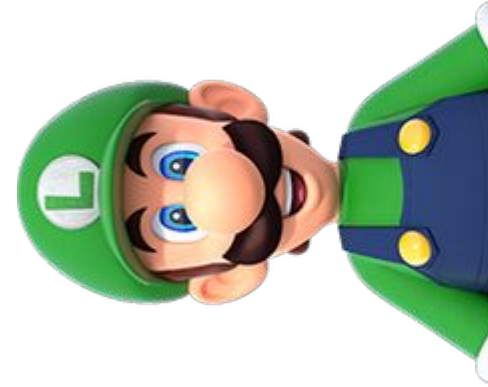




The Hypotheses

Null (H_0): There is no linear relationship between the bid start price and the final/total price the product is sold for. ($b_1 = 0$)

Alternate (H_A): There is a significant linear relationship between the bid start price and the final/total price the product is sold for. ($b_1 \neq 0$)



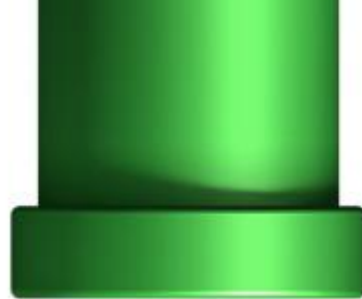


The Method

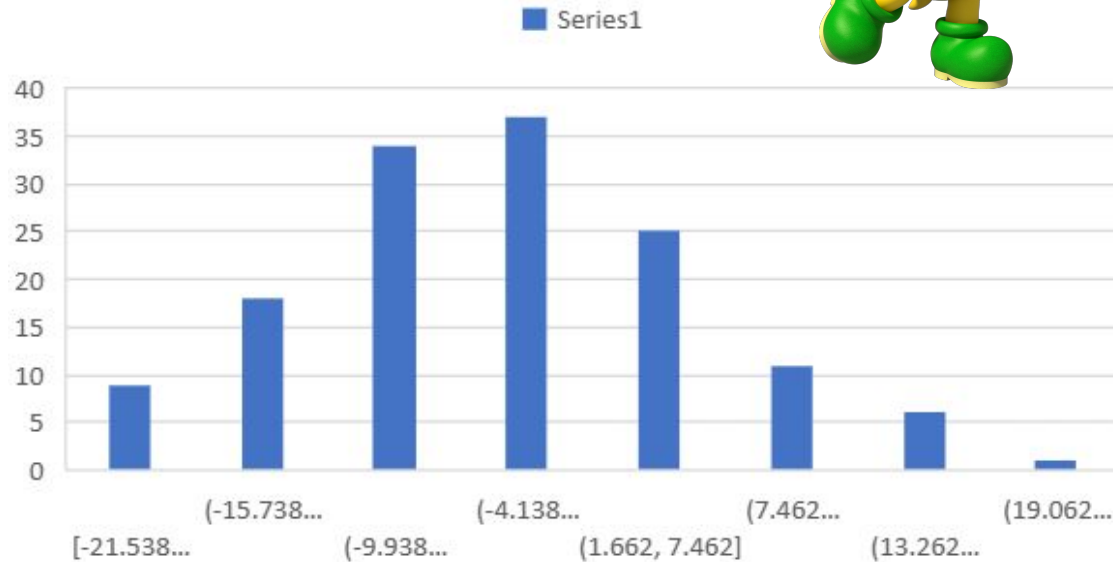
Linear Regression

Criteria:

- *Independent random samples*
- *Normally Distributed Residuals*
- *Homoskedastic Residuals*

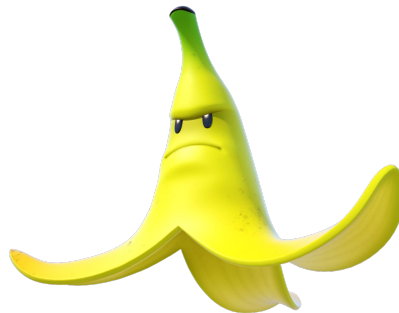


The Method



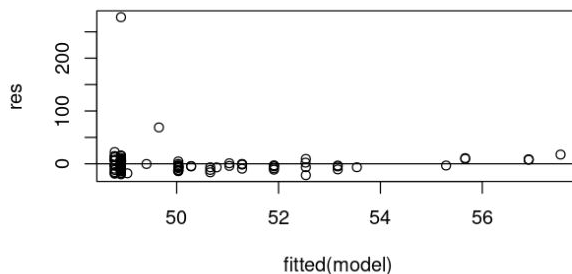
Plotted to the left are the density of Residual values of the observations, which can be seen to fall into a largely normal distribution. Having observed this, we can move forward in our use of the linear regression model to understand the data.

Residuals



R code for residuals

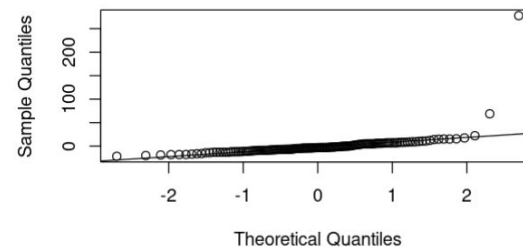
```
```{r}
data(mariokart)
model <- lm(total_pr~start_pr,
data=mariokart)
res <- resid(model)
plot(fitted(model), res)
abline(0,0)
qqnorm(res)
qqline(res)
plot(density(res))
model
```
```



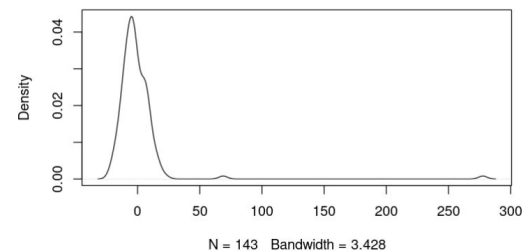
Coefficients for the linear model:

```
Coefficients:
(Intercept)    start_pr
   48.7820         0.1252
```

Normal Q-Q Plot



density(x = res)

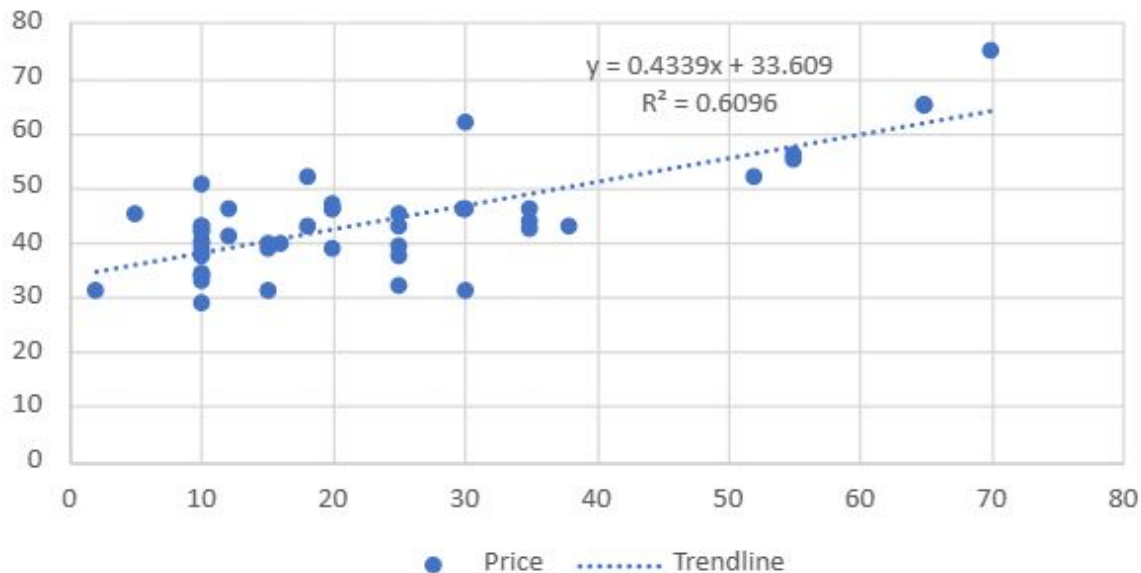




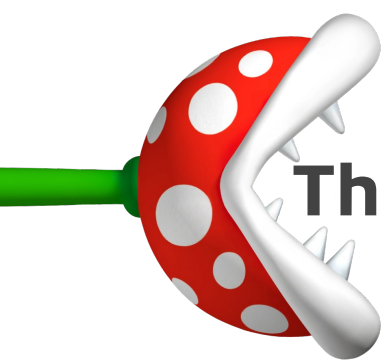
Data Exploration



Start Price vs. Final Price

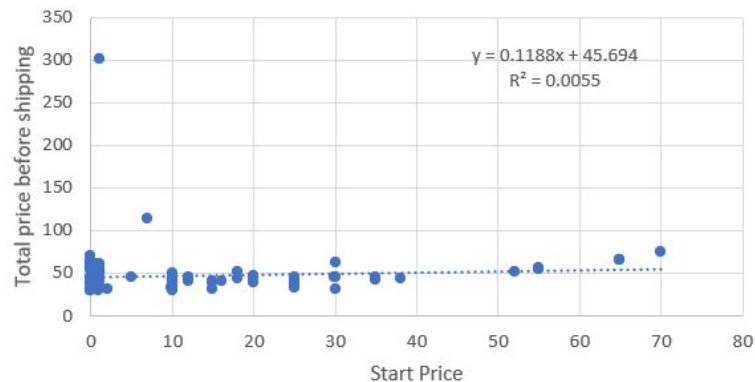
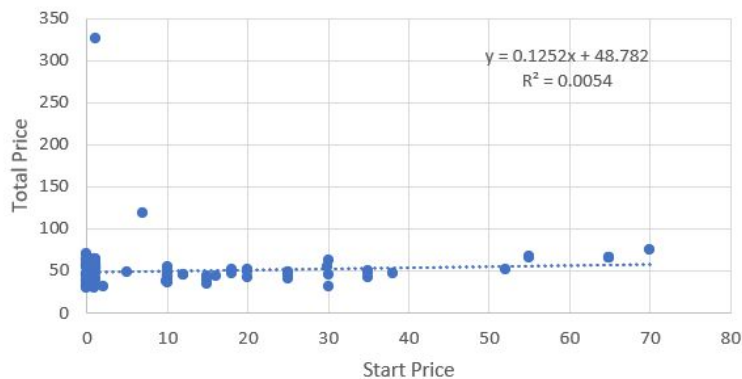


Start price/final price (excluding shipping) for start prices above 1.0, with an outlier at 350 removed.



The Results

- No relation between start and end price
- Excluding item which began below 1\$, a slight relation was found with R^2 value of 0.6





The Conclusion

- We have found no significant relationship between start price and end price
- If you want to guarantee a high total price, you need to set initial price high.
 - However, we didn't take into account the length of the auction listed and if there was any difference in quantity/quality of item listed or auctions for this specific item.
- Mario Kart is the greatest game in the world

