

IDS 702: Final Project | An Analysis of the Sneaker Resale Market

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11/22/20

Summary

After analyzing and fitting data scraped from Kicks on Fire and StockX to a multi-linear regression model, this analysis answered the following inferential questions: *Which of the variables appears to be the best covariate for explaining sneaker resale values? What is the likely range for the difference in resale values for collaborated and non-collaborated sneakers? Is there any evidence that the association between sentiment and resale values differ by collaborations? Are there other interesting associations with resale values that are worth mentioning and modeling?*

Ultimately, it was determined that the log of the resale price of a sneaker was the most important factor in determining the resale value of a sneaker. Additionally, there were associations found between sentiment and resale values differing by collaborations, the log of the retail price and resale values differing by Brand, and the main color and resale values of sneakers differing by collabs. Also, the likely range for the difference in resale values for collab and non-collab sneakers was a resale value increase of \$0.96 to \$1.20.

Introduction

Using data scraped from Kicks on Fire, a sneaker news website, and StockX, a resale marketplace for Sneakers, the aim of this analysis is to understand what factors effect a sneaker's resale value. The dataset contains over 6000 sneakers released over the past decade and their average resale value. Additional features such as did a designer collaborate on the shoe, the intended sex of the shoe wearer, if the sneaker was a retro, or if it was a kids shoe were engineered using regular expressions. The color of a sneaker was also assigned using a vector representation of the colorway string and getting the max cosine similarity of that vector with common colors to determine the "main color" of a sneaker.

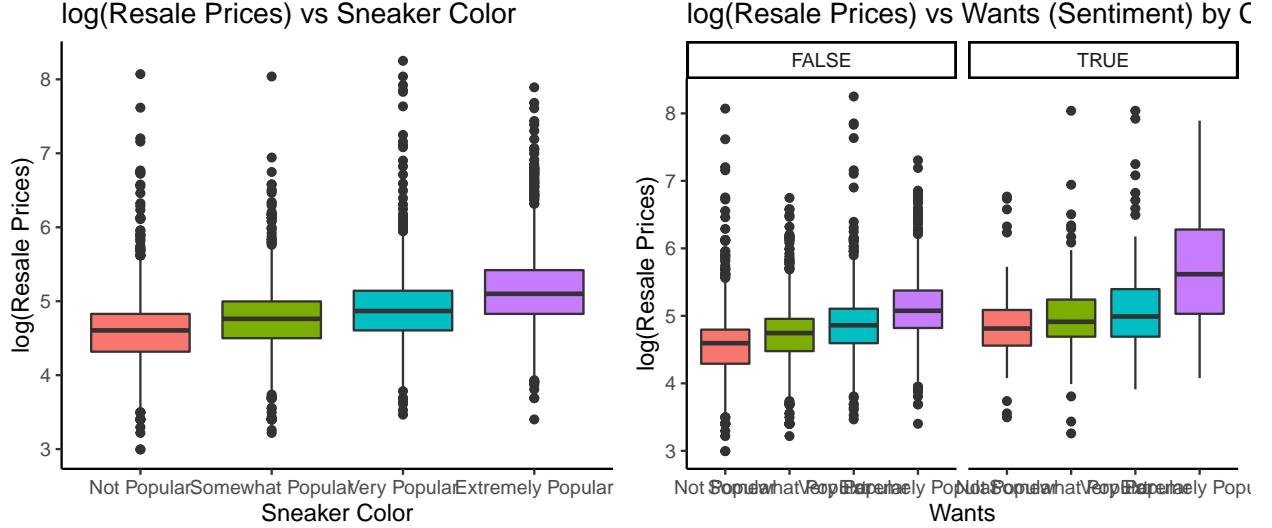
Ultimately, this analysis will answer inferential questions such as which variable is the biggest contributor to a sneaker's resale values, a likely range for differences in resale values for collab and non-collab sneakers, and potential evidence of associations, in particular, between sentiment and resale values differing by collaborations. To answer the questions posed, this analysis will explore the data, fit multi-linear regression models with appropriate features, and interpret the results.

Exploratory Data Analysis (EDA)

Data Transformation Before beginning the analysis, the number of null values in the dataset were counted. Although there were no null values found in the predictors, there were 181 rows in the response variable missing values. Ultimately, these rows were removed instead of imputed since they accounted for less than 3% of the entire dataset and it wasn't apparent if they weren't on StockX or missed by the scraper. After removing those rows, the final dataset contained 6,164 unique observations and 12 model interpretable columns.

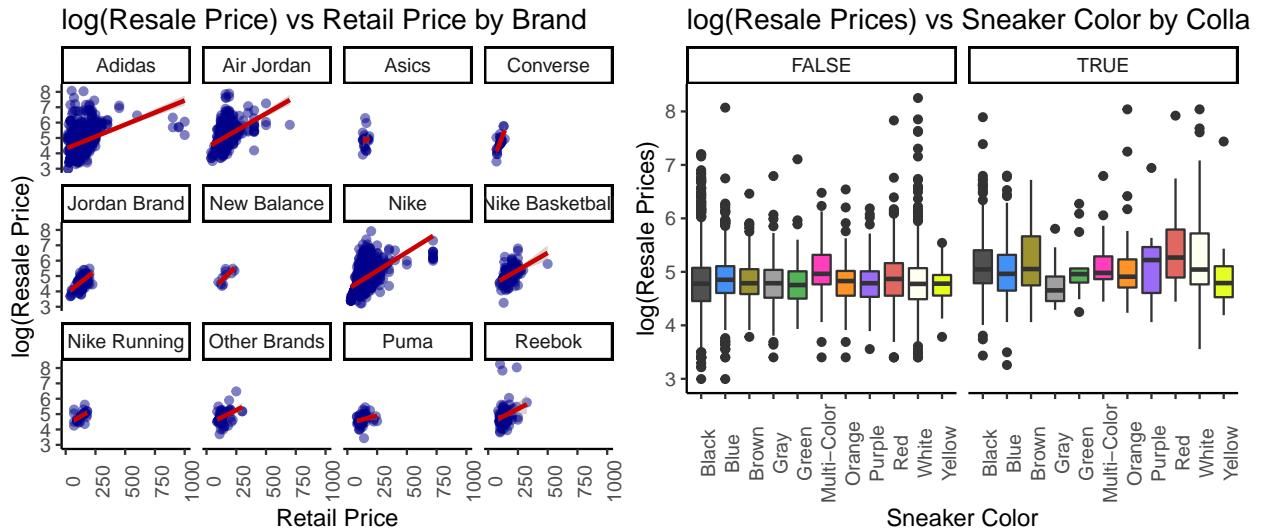
Since one of the assumptions of a linear model is normality, the distribution of the response variable was plotted in a histogram. The distribution of Resale prices were skewed left, and therefore multiple transformation were performed. Ultimately, the log transformation had the best resemblance to a normal distribution. This transformation was used for the rest of the analysis.

The "wants" column scraped from Kicks on Fire is akin to a like button, and therefore a proxy for public sentiment for each sneaker. The distribution of "wants" was heavily skewed left with a wide range of values. Due to this, and since many sneakers had zero "wants", the column was binned into four groups roughly representing the quartiles of values in the column. A sneaker with less than 50 "wants" was considered "Not Popular", greater than equal to 50 and less than 250 was "Somewhat Popular", greater than or equal to 250 and less than 1000 was "Very Popular", and greater than or equal to "1000" was "Extremely Popular". The figure on the left below visualizes the distribution of each category.



Data Visualization Due to our interest in a possible association between sentiment and resale values by whether or not a sneaker was collaborated on, the plot on the right (above) visualizes that relationship. This revealed that there does appear to be a difference in resale values among each popularity group when collaborated on versus not. Although the resale distributions for non-collaborated sneakers look similar to the overall distribution of the data set (above, left), the distributions for sneakers that were collaborated do not. The median resale values for “Somewhat Popular” and “Very Popular” collaborated sneakers appear to be roughly the same, as compared to before. The median value and distribution of extremely popular & collab sneakers, seem to be higher than before as well.

Two other potential associations found while performing EDA can be seen in the plots below. The graph on the left shows the log of resale prices versus retail prices by brand. From this chart, we can make out that some brands, such as Converse, Nike, Air Jordan, and Adidas, all appear to have strong positive correlations between the two variables. Meanwhile, some brands such as Puma and Asics, have relatively flat slopes with no correlation. The second graph on the right depicts the log of resale prices versus color by collaboration. The resale value medians and distributions for each color vary a lot more for sneakers that are collab versus not. In particular, the resale value distributions for brown, purple, red, and white sneakers seem to be a lot higher when collaborated on, while for gray sneakers they seems to decrease. All of these potential associations will be tested for statistical significance when modeling.



Model

Model Selection The final model was selected based on findings from the EDA, AIC and BIC step-wise model selection, and ANOVA f-tests. When checking model diagnostic plots, it was determined that the log transformation of the retail price for each sneaker would create more randomness among the residuals in the residuals vs fitted plots and was necessary to satisfy the linearity assumption. The rest of the variables were all categorical, and therefore no other transformations to predictors were made. The final model took the form: $y_i = \beta_0 + \beta_1 Brand + \beta_2 ReleaseMonth + \beta_3 ReleaseDay + \beta_4 Sex + \beta_5 Collab + \beta_6 Retro + \beta_7 Kids + \beta_8 Color + \beta_9 BinWants + \beta_{10} log(RetailPrice) + \beta_{11}(BinWants : Collab) + \beta_{12}(log(RetailPrice) : Brand) + \beta_{13}(Collab : Color)$ and the model summary can be seen on the next page. Since the response is the log of resale values, it is important to exponentiate the coefficients before model interpretation.

For this analysis, only variables that had p-values lower than the 0.05 level were deemed to be statistically significant. Therefore, brand, release month, release day, retro, “wants” binned, log of retail price, the interaction between brand and the log of retail price, the interaction between collab and “wants” binned, and the interaction between collab and main color were all statistically significant variables. The model’s intercept is 15.21, which means that, if all variables are set to 0 or their respective baseline, the average resale price of a sneaker would be \$15.21. The intercept is also statistically significant as its’ p-value is smaller than 0.05. The adjusted r-squared value for the model is ~0.38, which means about 38% of variability in the dataset can be explained by the variables in our model.

From the model summary, it can be determined that the log of the sneaker’s retail price is the best covariate for explaining sneaker resale values. This is because this variable had the highest absolute t-value. Higher absolute t-values indicate greater evidence against the null hypothesis and importance in predicting the response variable. For every additional increase in the log of the retail price, the resale value, on average, for a sneaker increases by \$1.48, holding all other variables constant.

Additionally, since the interaction between collaborations and “wants” binned was statistically significant, we know that there is evidence of an association between sentiment and resale values different. For the interaction, non-collaborated sneakers and “Not Popular” were the model’s baseline. The statistically significant effects of this interaction can be interpreted as, if all other variables are held constant, on average, for sneakers that were collaborated on and were “Somewhat Popular”, the average resale price of a sneaker increased by \$1.13 compared to the model baseline. For the same conditions, on average, sneakers that were collaborated on and were “Extremely Popular”, the average resale price of a sneaker increased by \$1.69 compared to the model baseline. Although not statistically significant on the 0.05 level, holding all variables constant, sneakers that were collaborated on and were “Very Popular”, the average resale price of a sneaker increased by \$1.12 compared to the model baseline.

	2.5 %	97.5 %
collabTRUE	0.9618569	1.199861

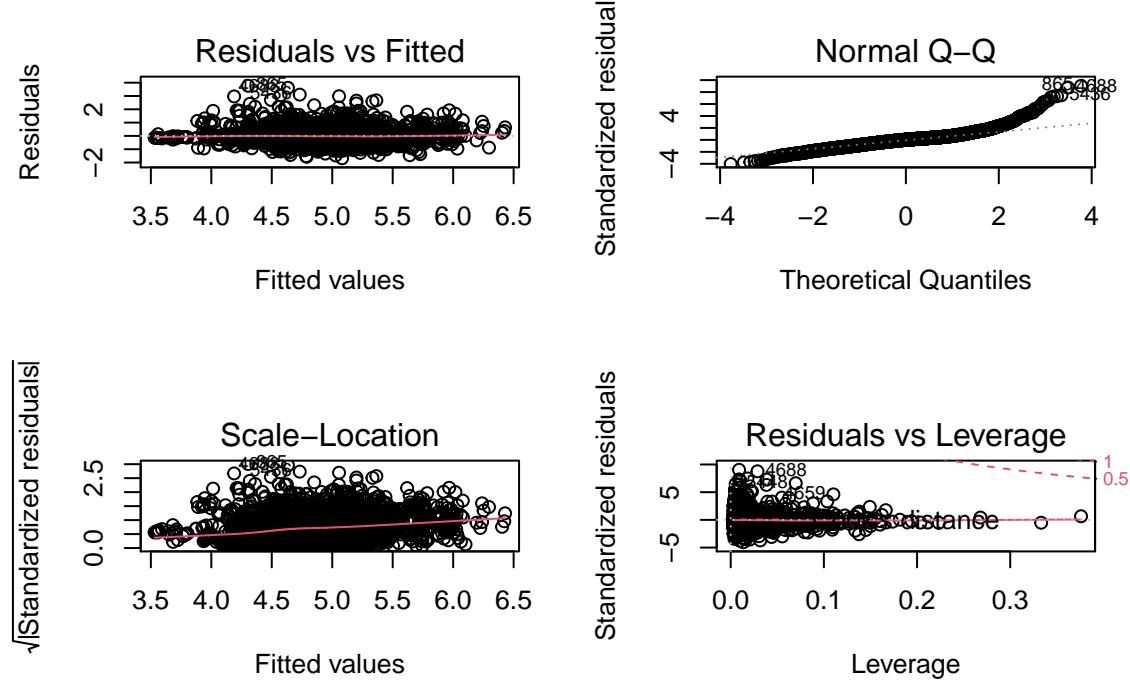
Next, a likely range for the difference in sneaker resale values for collab and non-collab sneakers can be found by getting the 95% confidence interval of the collab variable for the final model, which can be seen above. Based on the 95% confidence interval for the variable collab, if all other variables are held constant, the average resale price of a collab sneaker increases by \$0.96 to \$1.20 compared non-collab sneakers. It is worth noting that collab was not found to be significant on its own, but was significant in its interaction between sneaker sentiment and color.

term	estimate	std.error	statistic	p.value
(Intercept)	2.7220249	0.1309938	20.7797938	0.0000000
brandAir Jordan	-1.4736253	0.2795425	-5.2715610	0.0000001
brandAsics	5.8292930	3.9994977	1.4575063	0.1450282
brandConverse	-3.8826690	1.9132581	-2.0293493	0.0424661
brandJordan Brand	-1.0193292	0.6562504	-1.5532626	0.1204123
brandNew Balance	-3.7749322	2.5269023	-1.4938972	0.1352543
brandNike	-1.7853927	0.1626169	-10.9791346	0.0000000
brandNike Basketball	-2.1295007	0.7247864	-2.9381078	0.0033146
brandNike Running	-0.9793677	1.2241818	-0.8000182	0.4237314
brandOther Brands	0.0420777	0.9012705	0.0466871	0.9627641
brandPuma	0.0597020	1.0646902	0.0560746	0.9552843
brandReebok	-0.2161552	0.8269331	-0.2613938	0.7937977
release_monthFeb	0.0263528	0.0289974	0.9087966	0.3634935
release_monthMar	0.0787506	0.0289739	2.7179847	0.0065867
release_monthApr	0.0246435	0.0294154	0.8377768	0.4021889
release_monthMay	-0.0198294	0.0307540	-0.6447755	0.5190969
release_monthJun	0.0413382	0.0297805	1.3880963	0.1651585
release_monthJul	0.0167872	0.0303453	0.5532063	0.5801424
release_monthAug	0.0262351	0.0299913	0.8747593	0.3817394
release_monthSep	0.0685826	0.0309396	2.2166588	0.0266832
release_monthOct	0.0401937	0.0316186	1.2712069	0.2037036
release_monthNov	0.0872633	0.0299581	2.9128457	0.0035945
release_monthDec	0.0826664	0.0303689	2.7220703	0.0065059
release_dowMonday	0.1008594	0.0351539	2.8690810	0.0041308
release_dowTuesday	0.0225498	0.0327940	0.6876176	0.4917198
release_dowWednesday	0.0251268	0.0300584	0.8359345	0.4032245
release_dowThursday	-0.0109732	0.0266154	-0.4122877	0.6801431
release_dowFriday	0.0091321	0.0278366	0.3280599	0.7428777
release_dowSaturday	0.0359227	0.0270957	1.3257686	0.1849660
wmnsTRUE	0.0262820	0.0160629	1.6361880	0.1018519
collabTRUE	0.0716579	0.0563916	1.2707185	0.2038773
retroTRUE	0.1620268	0.0323543	5.0078971	0.0000006
kidsTRUE	-0.0153924	0.0228705	-0.6730217	0.5009590
main_colorBlue	0.0062015	0.0170300	0.3641490	0.7157594
main_colorBrown	-0.0273718	0.0381856	-0.7168096	0.4735190
main_colorGray	-0.0098409	0.0280986	-0.3502283	0.7261795
main_colorGreen	-0.0021702	0.0386206	-0.0561918	0.9551909
main_colorMulti-Color	0.0833139	0.0425781	1.9567304	0.0504248
main_colorOrange	-0.0628058	0.0384314	-1.6342321	0.1022618
main_colorPurple	-0.0292959	0.0369776	-0.7922620	0.4282388
main_colorRed	0.0083963	0.0238334	0.3522905	0.7246326
main_colorWhite	0.0147409	0.0150038	0.9824734	0.3259057
main_colorYellow	-0.0972134	0.0730376	-1.3310053	0.1832371
bin_wantsSomewhat Popular	-0.0248405	0.0176301	-1.4089882	0.1588897
bin_wantsVery Popular	0.0494566	0.0183010	2.7023988	0.0069032
bin_wantsExtremely Popular	0.1771991	0.0199648	8.8755807	0.0000000
log_retail_price	0.3921911	0.0263512	14.8832570	0.0000000
collabTRUE:bin_wantsSomewhat Popular	0.1199308	0.0592720	2.0233968	0.0430758
collabTRUE:bin_wantsVery Popular	0.1120288	0.0585095	1.9147114	0.0555761
collabTRUE:bin_wantsExtremely Popular	0.5248961	0.0615767	8.5242597	0.0000000
brandAir Jordan:log_retail_price	0.3238057	0.0553798	5.8470028	0.0000000
brandAsics:log_retail_price	-1.1940970	0.7962466	-1.4996572	0.1337550
brandConverse:log_retail_price	0.8384674	0.4181146	2.0053531	0.0449695
brandJordan Brand:log_retail_price	0.1898603	0.1341948	1.4148115	0.1571749
brandNew Balance:log_retail_price	0.7353419	0.4998966	1.4709880	0.1413460
brandNike:log_retail_price	0.3736445	0.0333368	11.2081817	0.0000000
brandNike_Basketball:log_retail_price	0.4352096	0.1406644	3.0939576	0.0019840
brandNike_Running:log_retail_price	0.2321527	0.2520508	0.9210552	0.3570581
brandOther Brands:log_retail_price	-0.0127406	0.1849630	-0.0688816	0.9450861
brandPuma:log_retail_price	-0.0637214	0.2202884	-0.2892636	0.7723895
brandReebok:log_retail_price	0.0502490	0.1679321	0.2992225	0.7647805
collabTRUE:main_colorBlue	-0.0863874	0.0534528	-1.6161427	0.1061152
collabTRUE:main_colorBrown	-0.0258520	0.0913443	-0.2830168	0.7771736
collabTRUE:main_colorGray	-0.3347995	0.1242360	-2.6948667	0.0070610
collabTRUE:main_colorGreen	0.1345769	0.1236725	1.0881715	0.2765624
collabTRUE:main_colorMulti-Color	-0.0872436	0.1087129	-0.8025135	0.4222873
collabTRUE:main_colorOrange	0.1608573	0.0918387	1.7515207	0.0799066
collabTRUE:main_colorPurple	0.0505746	0.1054543	0.5222600	0.6015083
collabTRUE:main_colorRed	0.0709415	0.0834196	0.8504179	0.3951262
collabTRUE:main_colorWhite	0.1100795	0.0470256	2.3408402	0.0192725
collabTRUE:main_colorYellow	0.0453065	0.1552968	0.2917414	0.7704943

Model Assesment The model diagnostics are shown in the graph below. Looking at the residuals vs. fitted plot, the model does seem to satisfy the independence and equal variance assumptions as the data points are randomly scattered throughout the plot and the red line indicating trends is straight. When looking at the Residual vs. Log(Retail), the linearity assumption doesn't appear to be violated as the as the plot shows the data points appear to be randomly distributed across the plot as well. Additionally, the Normal Q-Q plot indicates whether or not the assumption of Normality is violated by the model. Looking at the plot, the points roughly lie on the dashed line drawn, until the right most extremity. This is likely due to the long right tail of the response variable distribution. Therefore, the normality assumption appears to be satisfied as well.

Potential outliers, leverage points, and high influence points can all be identified using the Residuals vs. Leverage plot below. There are no high influence data points as there are no values with a Cook's distance greater than 0.5 or 1. A high leverage threshold was calculating using the formula $2 * (p + 1)/n$, revealing quite a

few high leverage points. Outliers could also be identified from the plot by looking at the y-values of the data points in the graph. The distribution of data points appear to follow a normal distribution and be found between 3 and -3 standard deviations, with most being within 2. Although there are also data points outside that range, no points were removed because none were high influence.



Finally, the Variance Inflation Factor (VIF) score for each variable in the model was calculated to determine how much multicollinearity between the variables in the model was inflating the variance of the regression coefficient for each variable. However, since the only continuous variable was the log of the retail price, that was the only VIF score worth noting. The log of the retail price had a VIF score of 3.31, and therefore we can safely say it's not correlated with other variables because it's lower than the high correlation threshold of 10.

Conclusion

In conclusion, the best covariate for explaining sneaker resale values was determined to be the log of the retail price. In general, the log of the retail price was positively correlated with resale values. Also, there was an association found between sentiment and resale values differing by collaborations. As discussed earlier, sneakers that were collaborated on and were “Somewhat Popular” or “Extremely Popular” on average had higher resale values than “Not Popular” and non-collab sneakers. Additionally, there were also associations found between the log of the resale price and resale values differing by Brand, as well as the main color and resale values of sneakers differing by collaborations. Although collaborations were not found to be statistically significant, the likely difference in resale values for collab and non-collab sneakers was found to be between an increase in \$0.96 to \$1.20 for collab sneakers versus not.

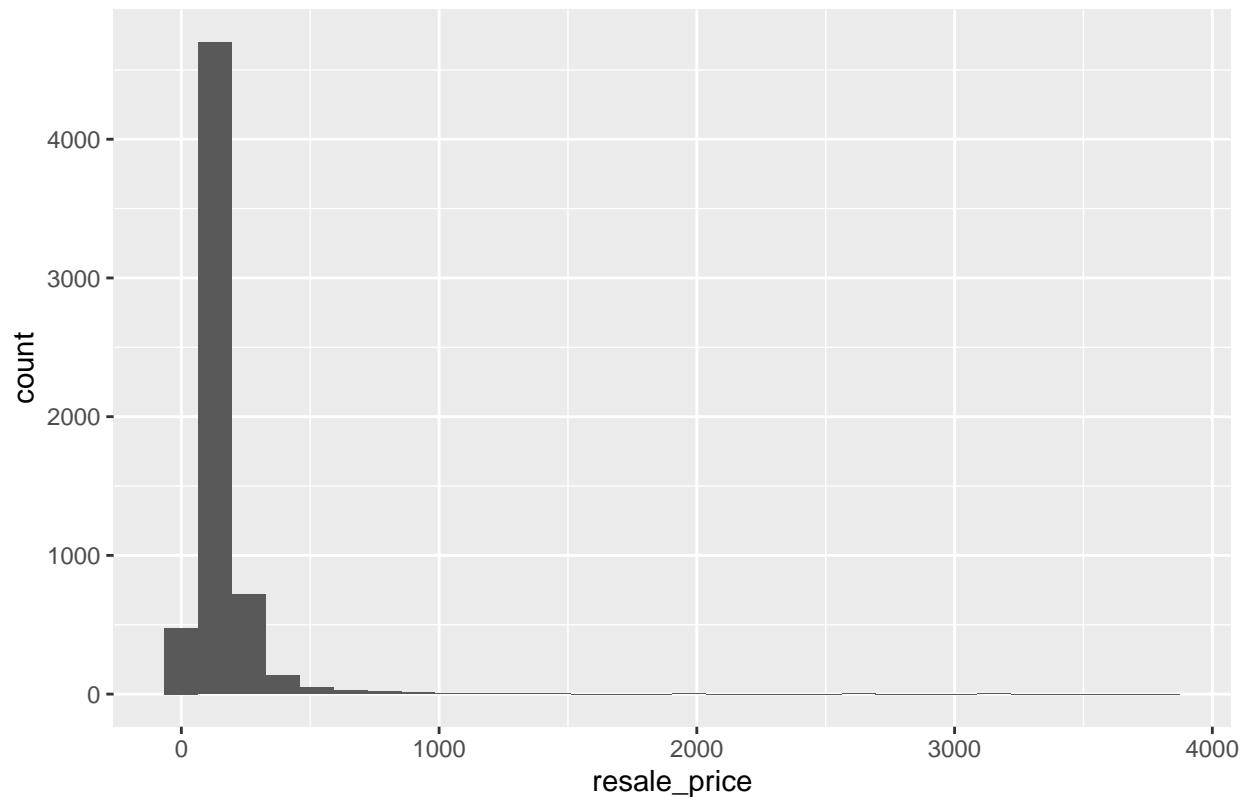
Overall, there were a few limitations of this analysis. First, the dataset built from Kicks on Fire is not an exhaustive list of every sneaker ever released and is generally biased towards talking about more “trendy” sneakers. Therefore, some brands may appear to only have sneakers with high resale values, such as Converse. Second, determining the main color for a sneaker is a tough job for a human to label, let alone a computer. Although the labels seemed generally accurate, the main color of a sneaker is hard to quantify and up for debate. Third, although the response variable is an average resale price of sneakers, according to StockX there has been found to be a range of average prices between different shoe sizes of the same sneaker which is something the model doesn't take into account.

Appendix

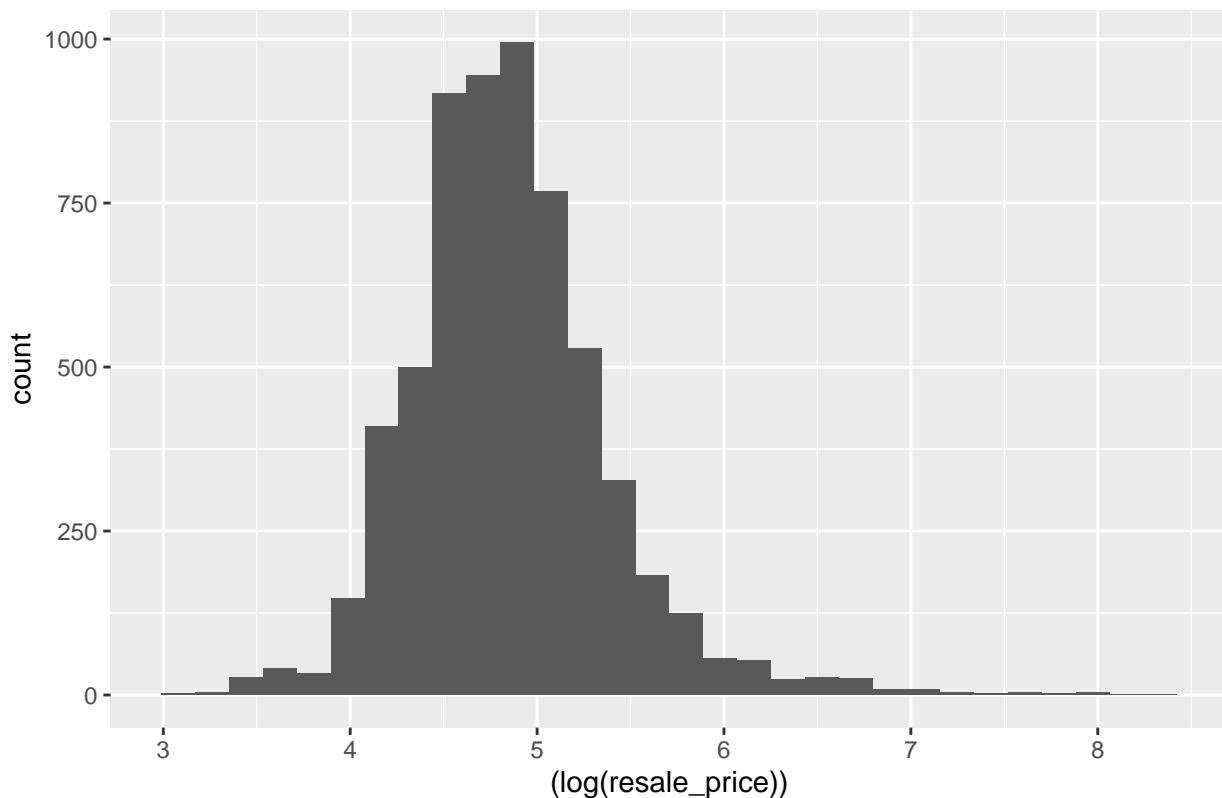
III. EDA

Distributions of response variable

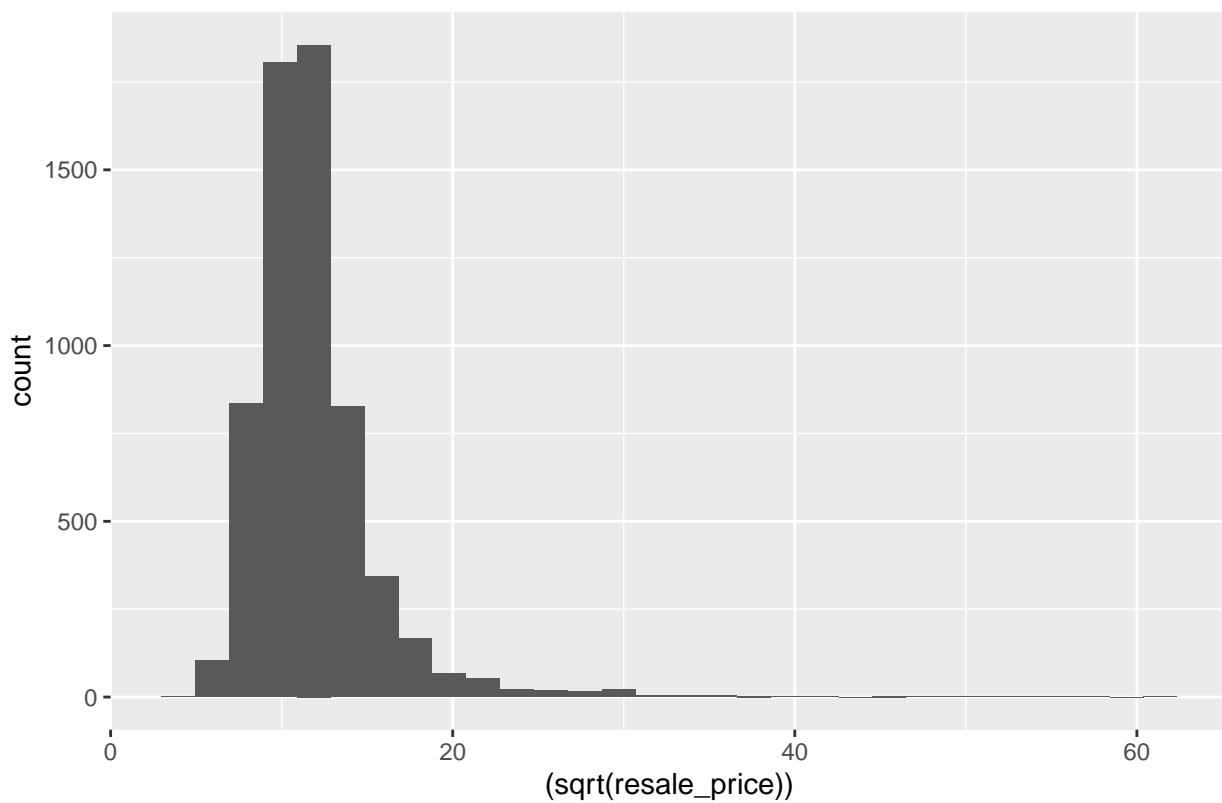
Distribution of sneaker resale values



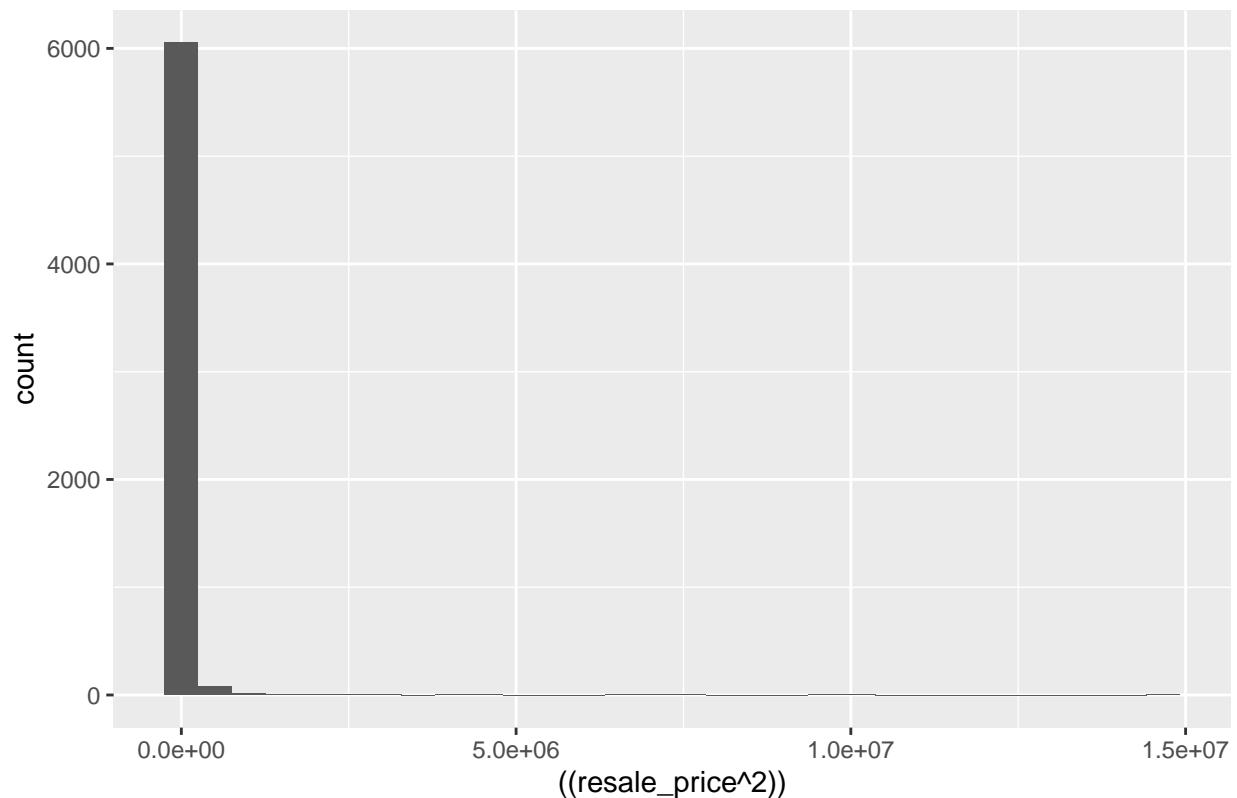
Log distribution of sneaker resale values



Square root distribution of sneaker resale values

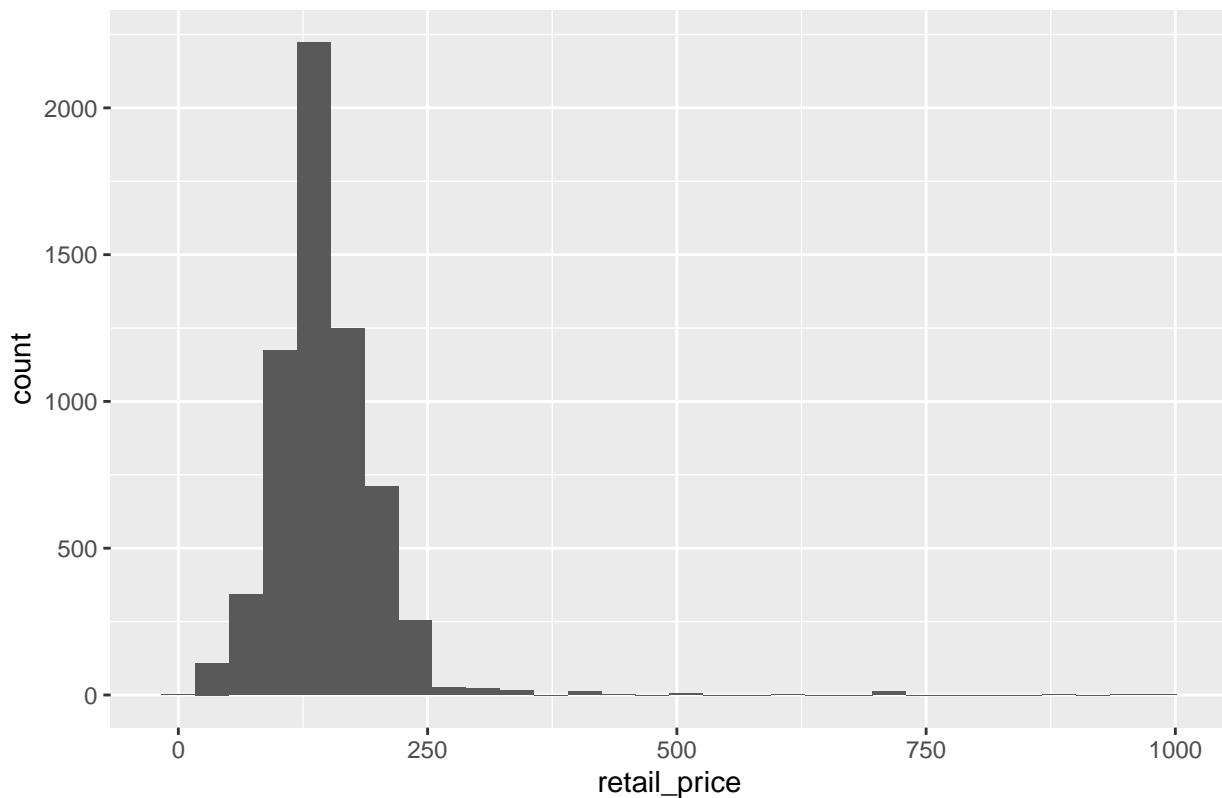


Square distribution of sneaker resale values

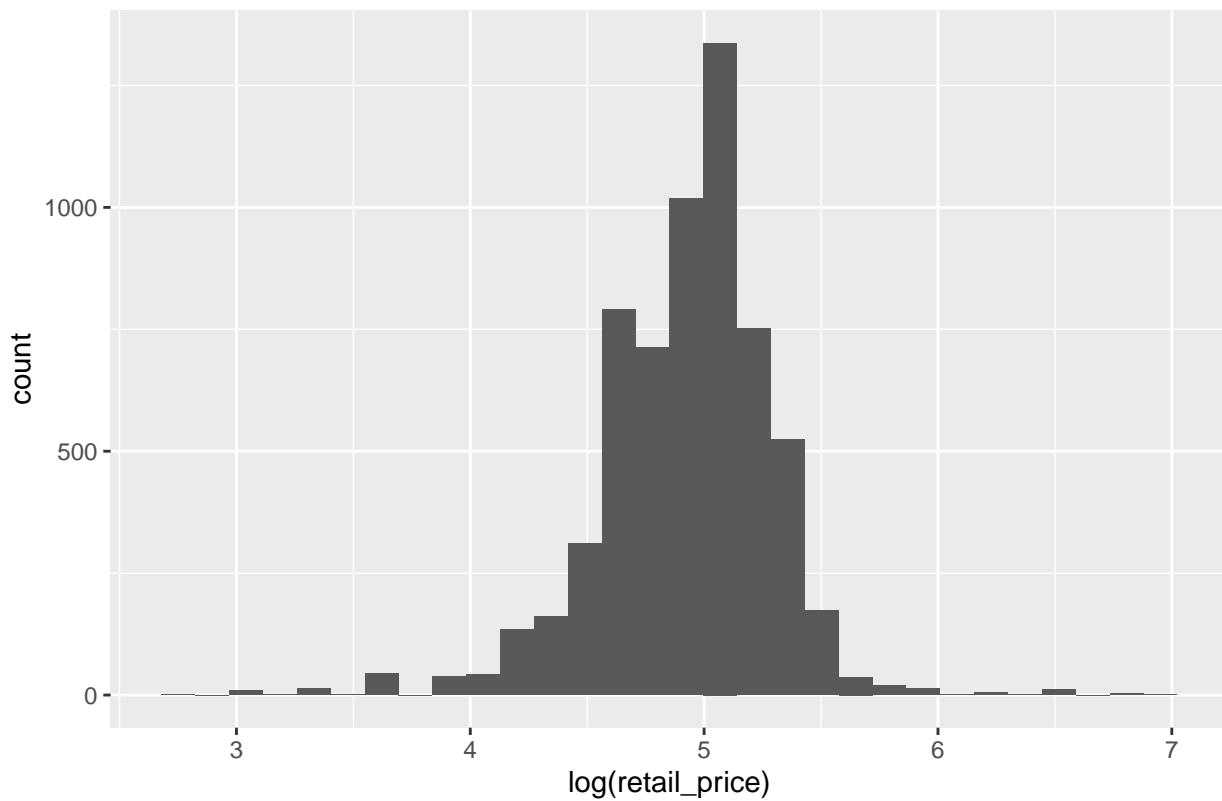


Distributions of retail price

Distribution of retail price

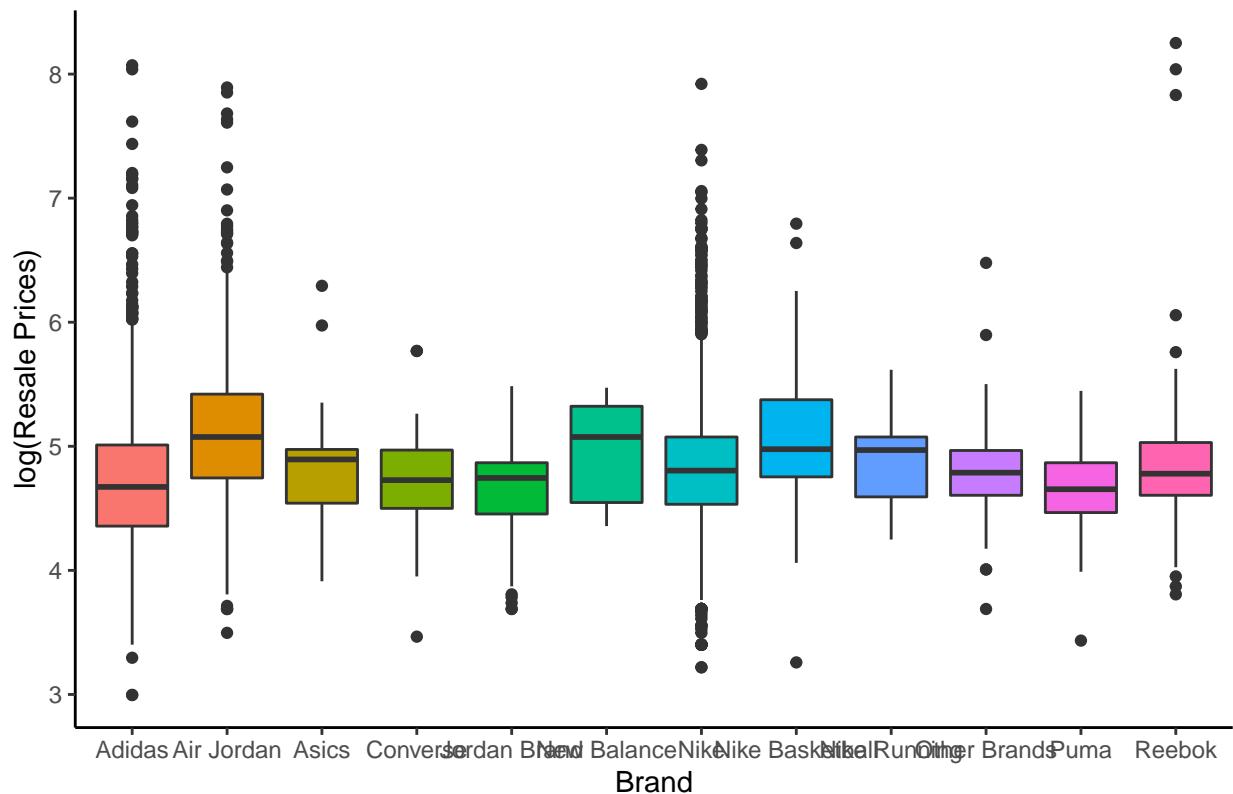


Distribution of retail price

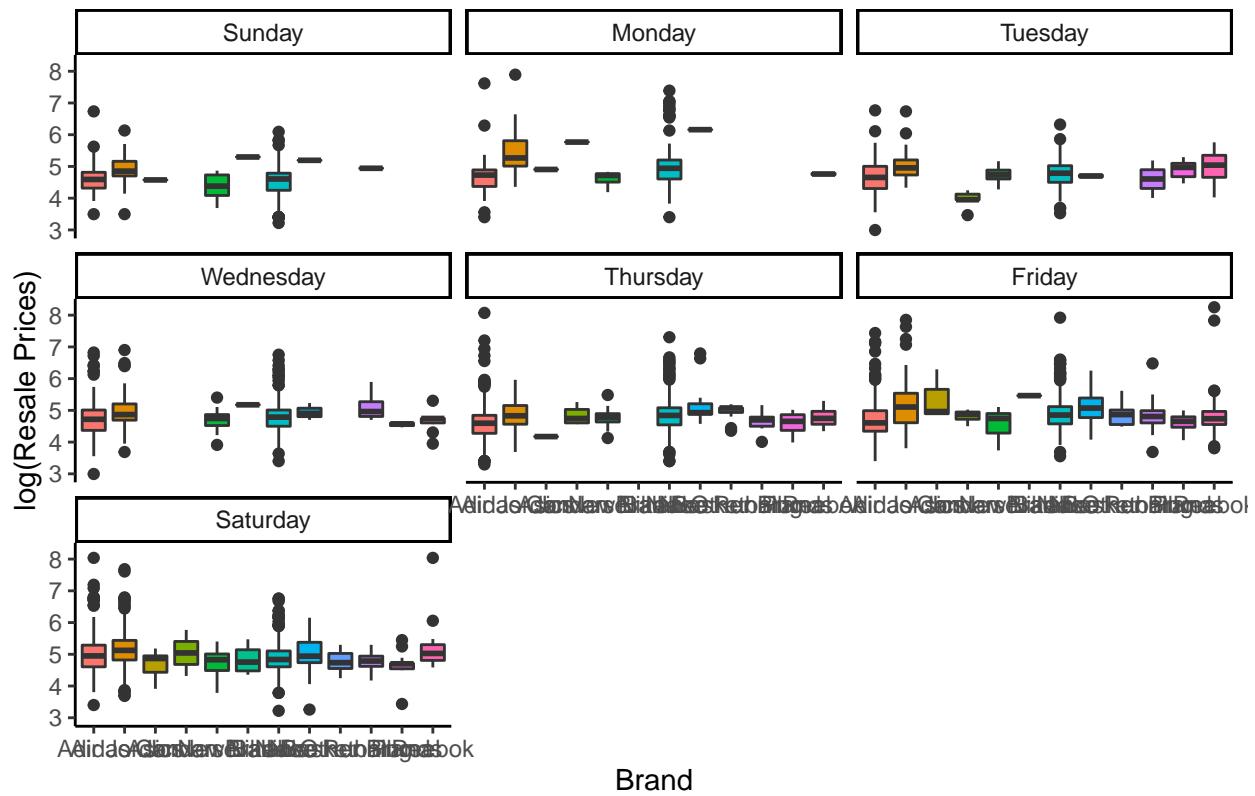


EDA for log resale vs brand

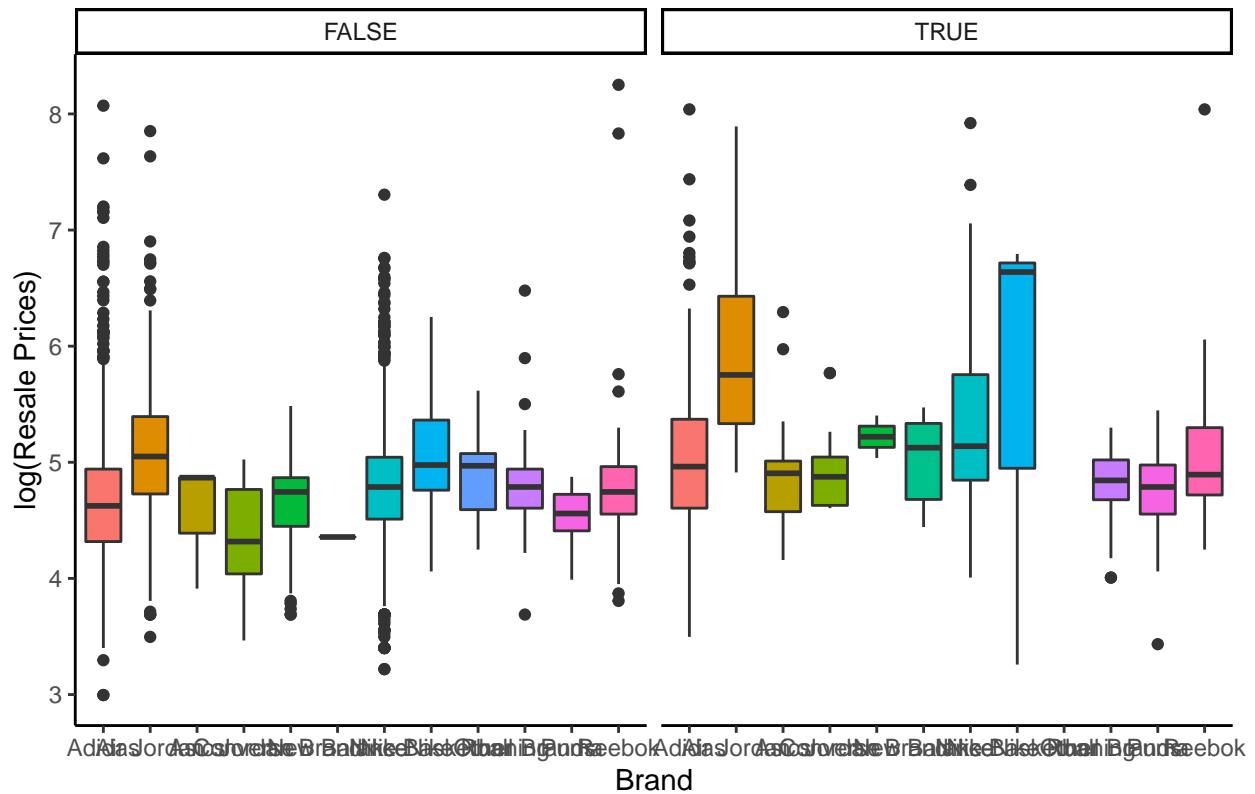
log(Resale Prices) vs Brand



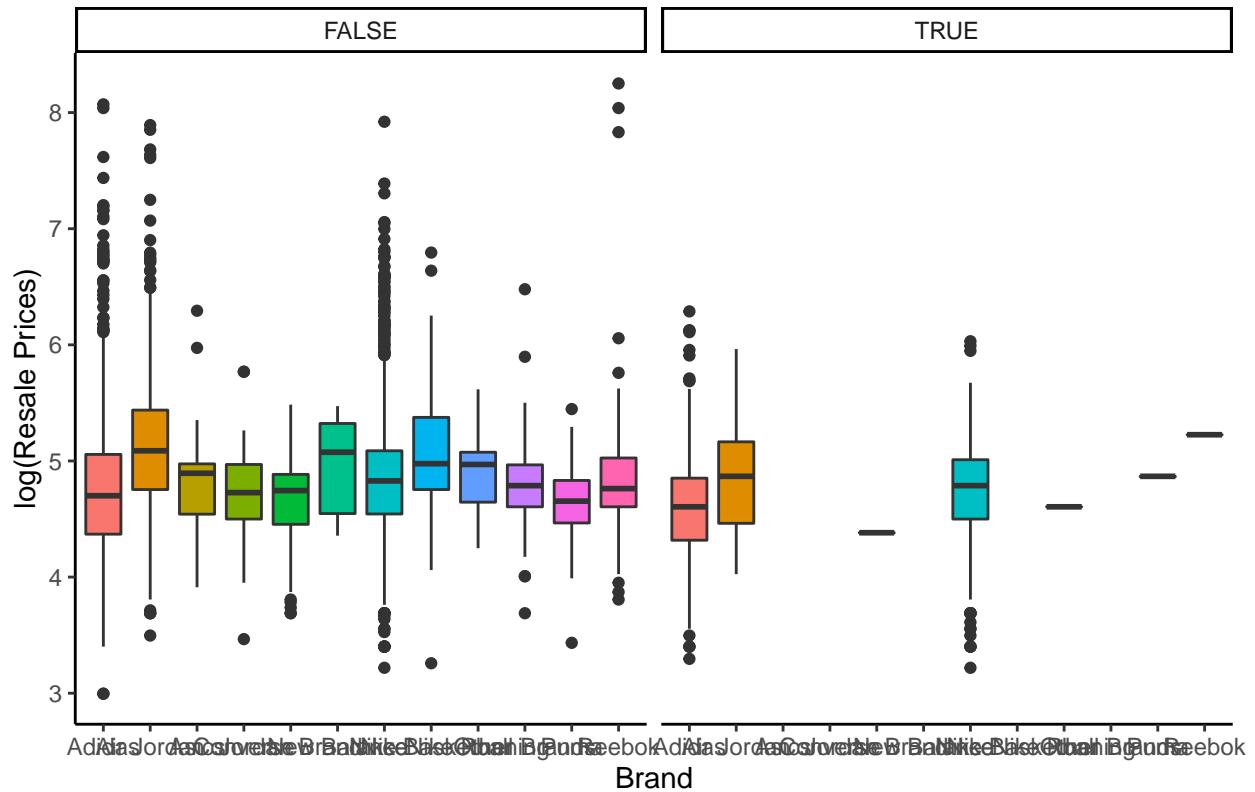
log(Resale Prices) vs Brand by Release Day of Week



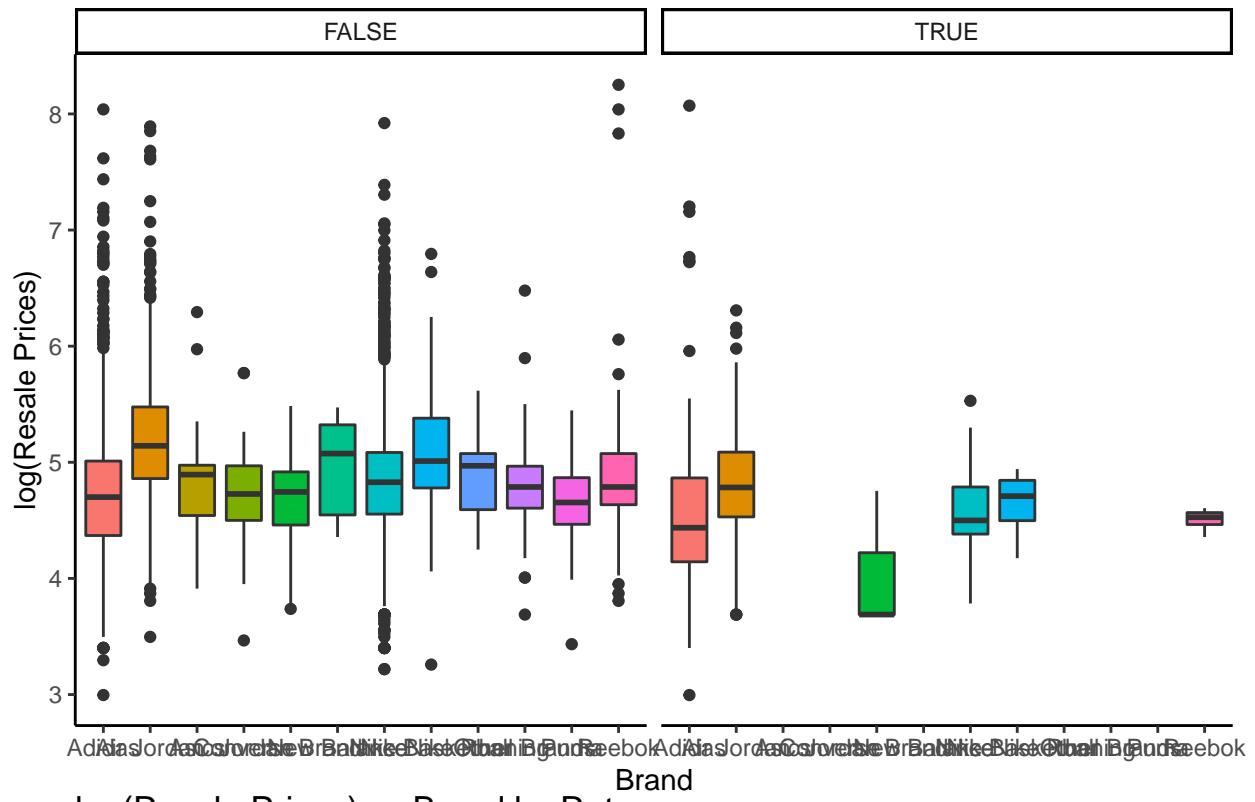
log(Resale Prices) vs Brand by Collab



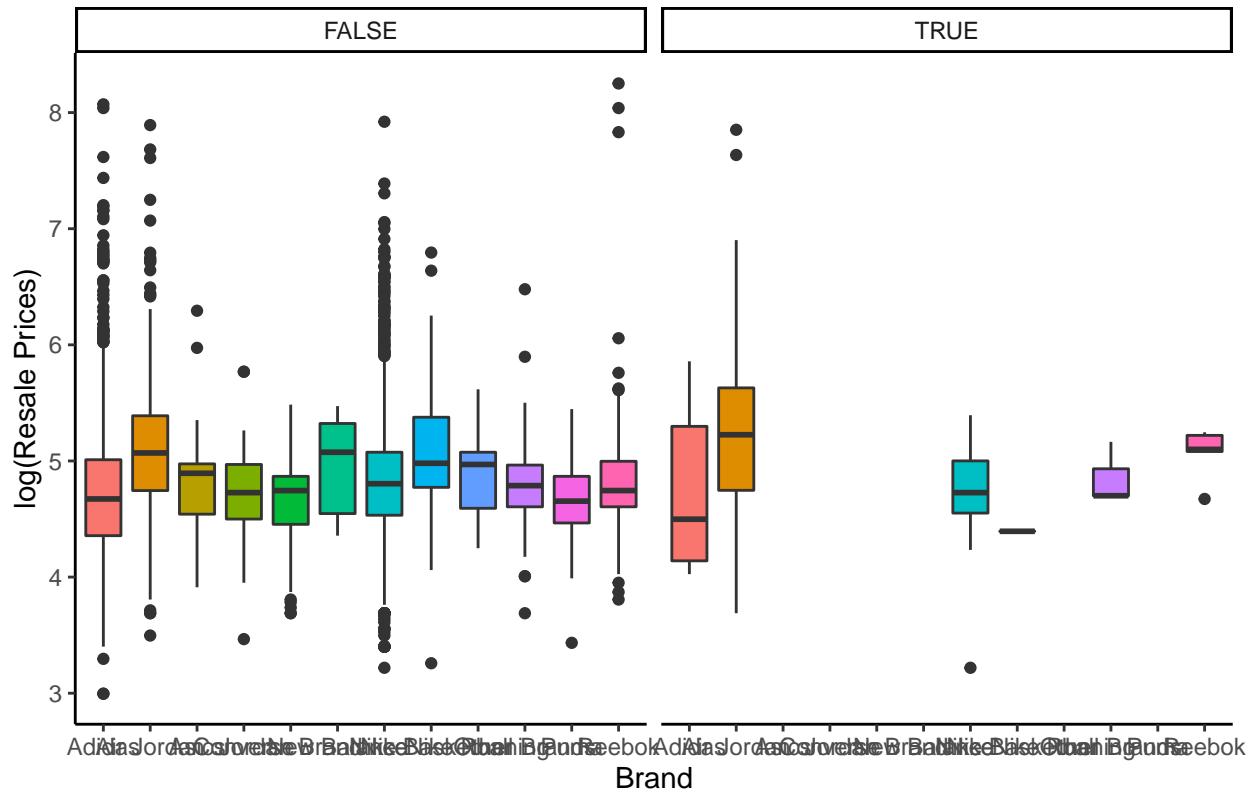
log(Resale Prices) vs Brand by Sex



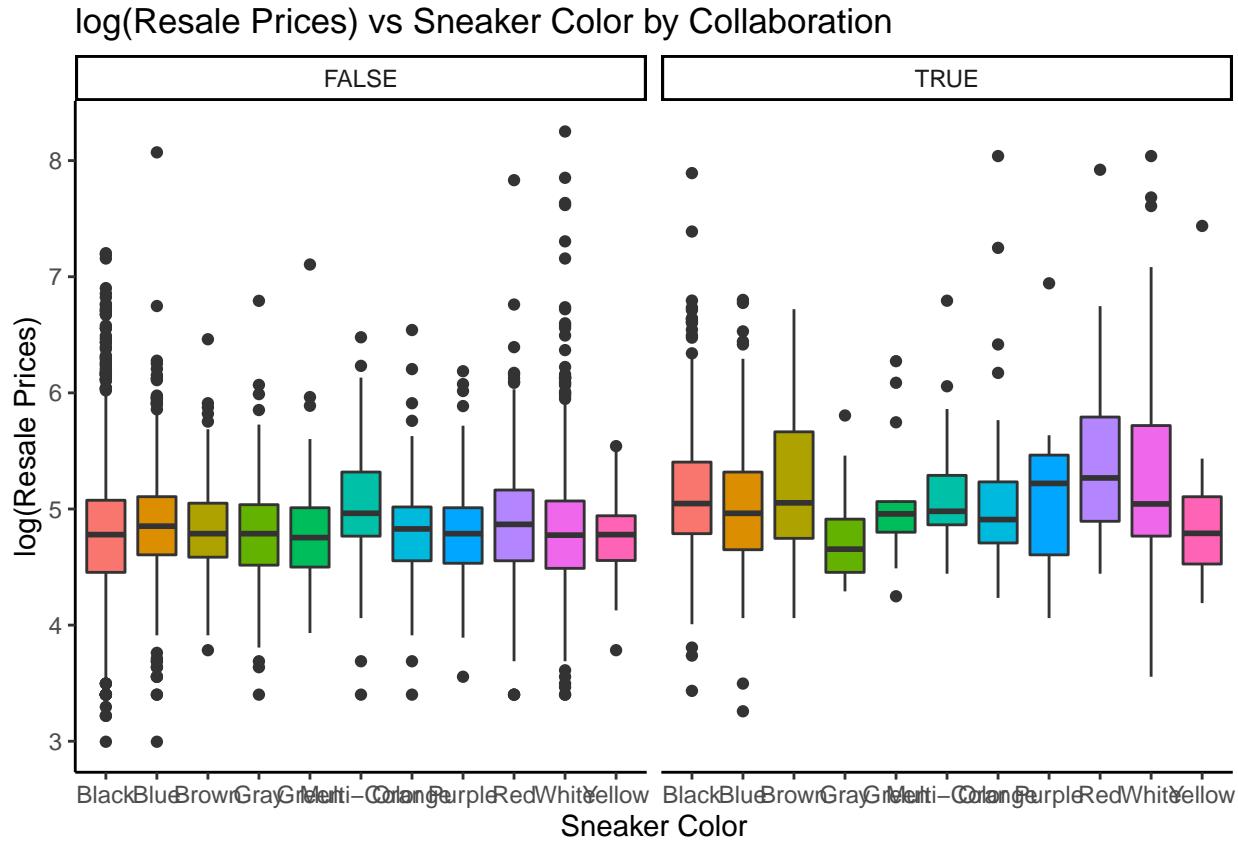
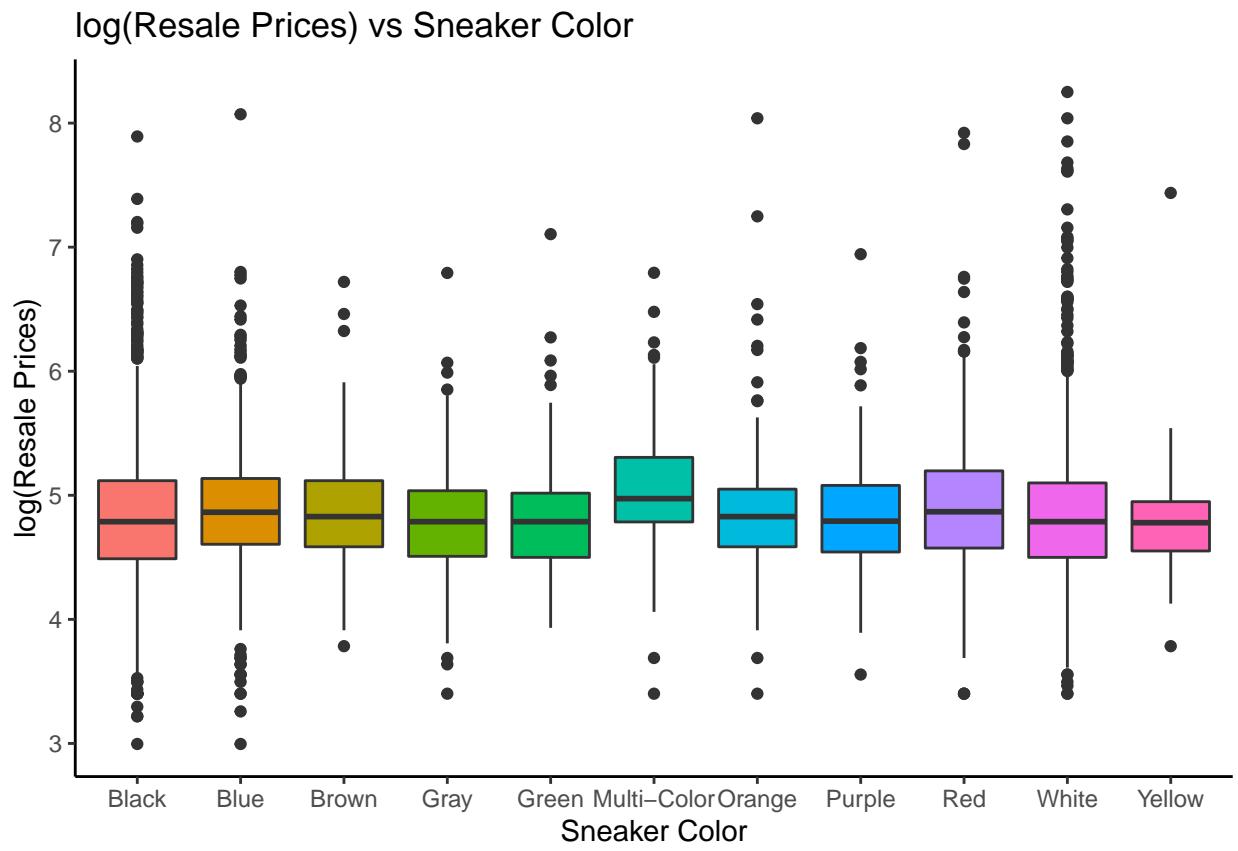
log(Resale Prices) vs Brand by Kid's Shoe



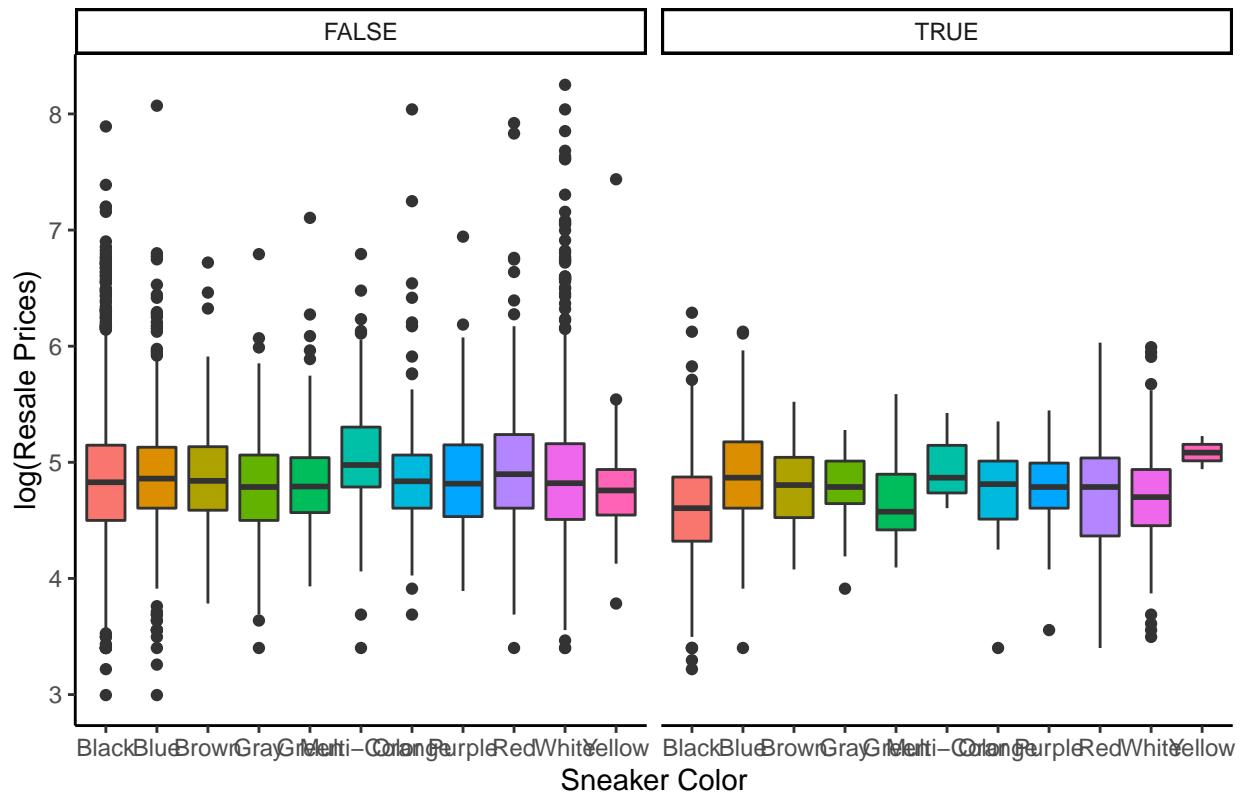
log(Resale Prices) vs Brand by Retro



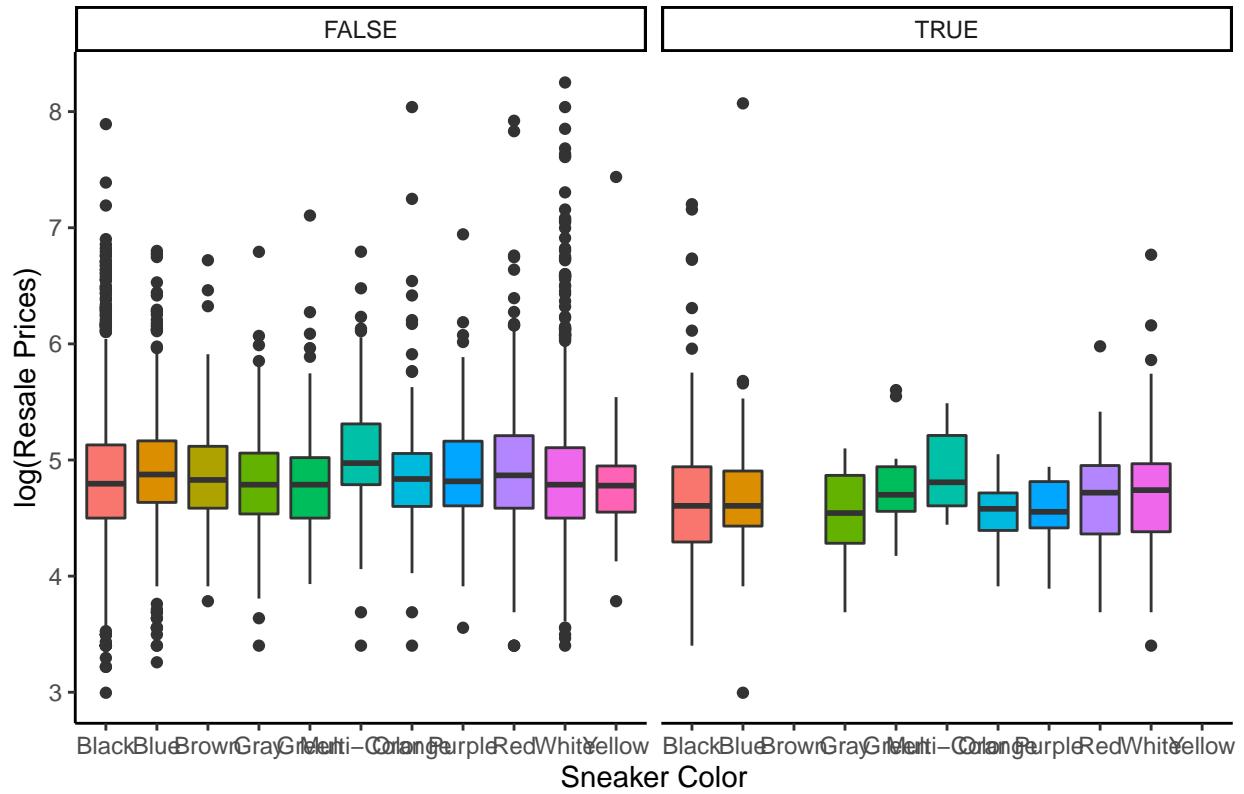
EDA for log resale vs main color



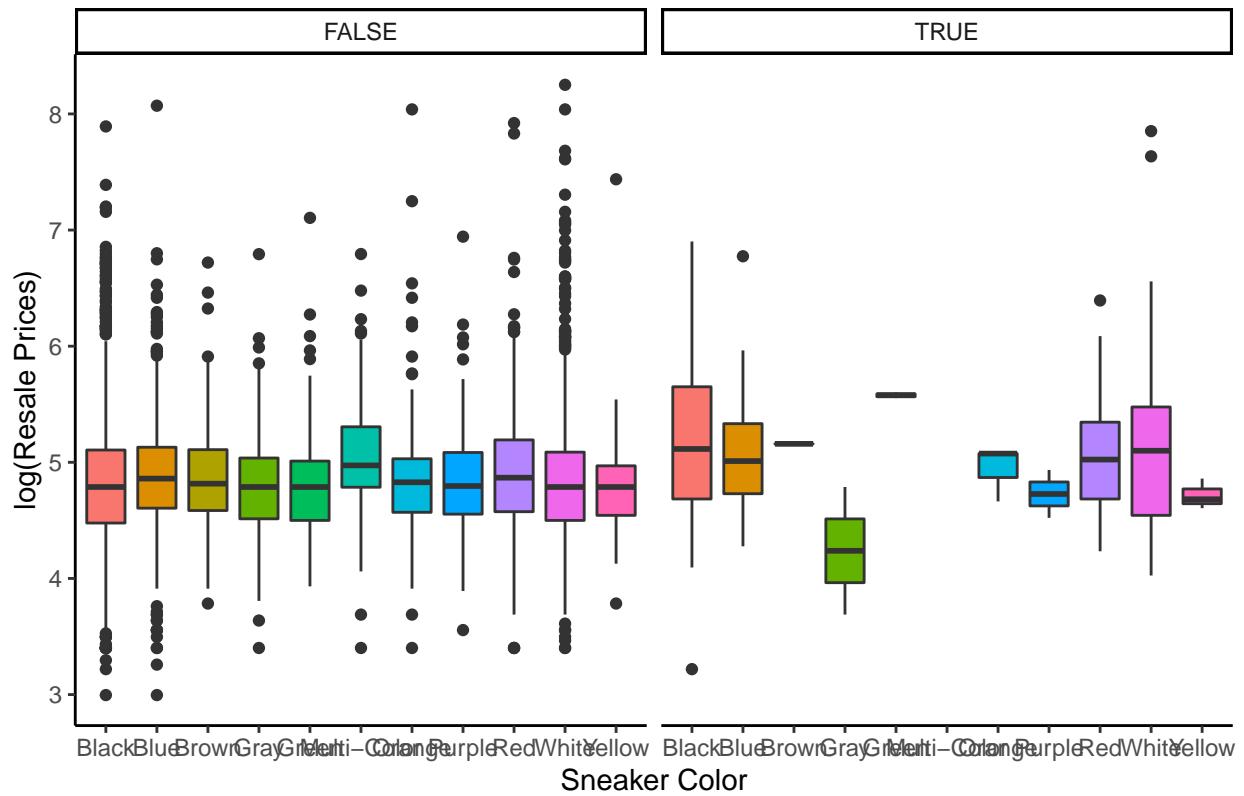
log(Resale Prices) vs Sneaker Color by Sex



log(Resale Prices) vs Sneaker Color by Kid's Shoe

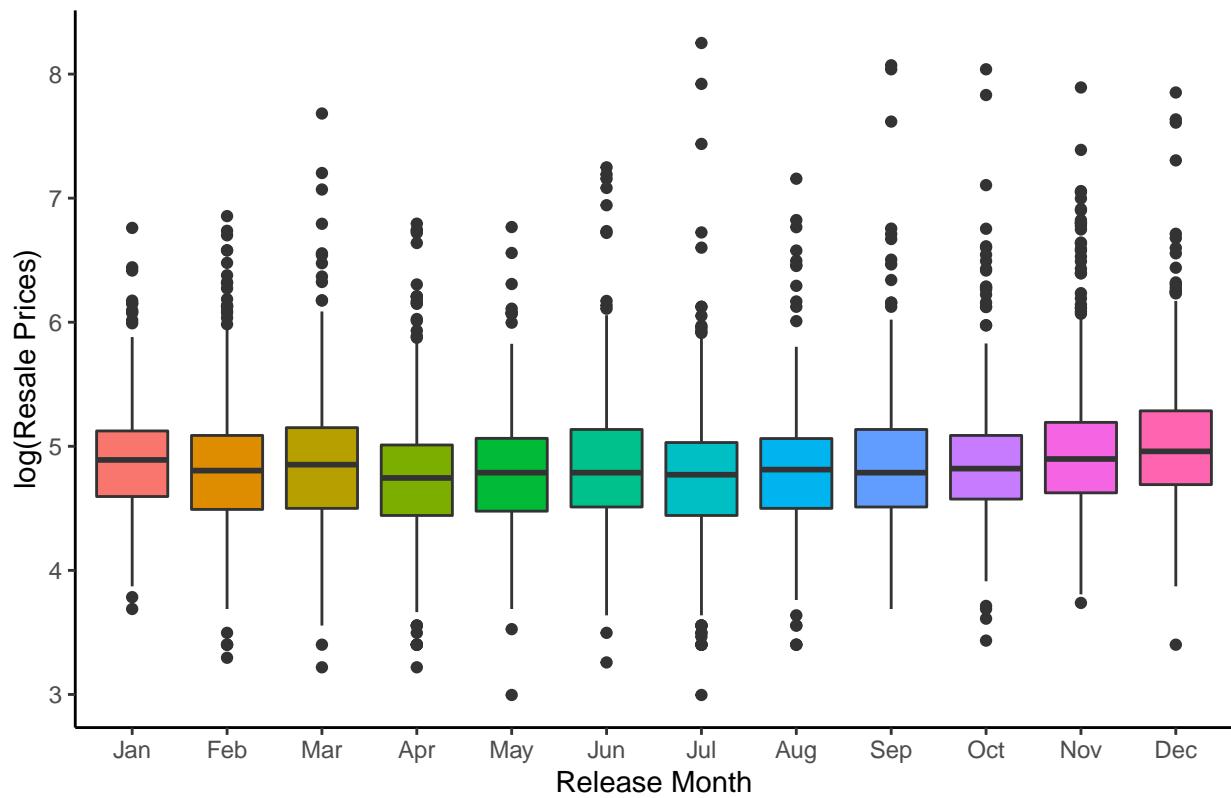


$\log(\text{Resale Prices})$ vs Sneaker Color by Retro



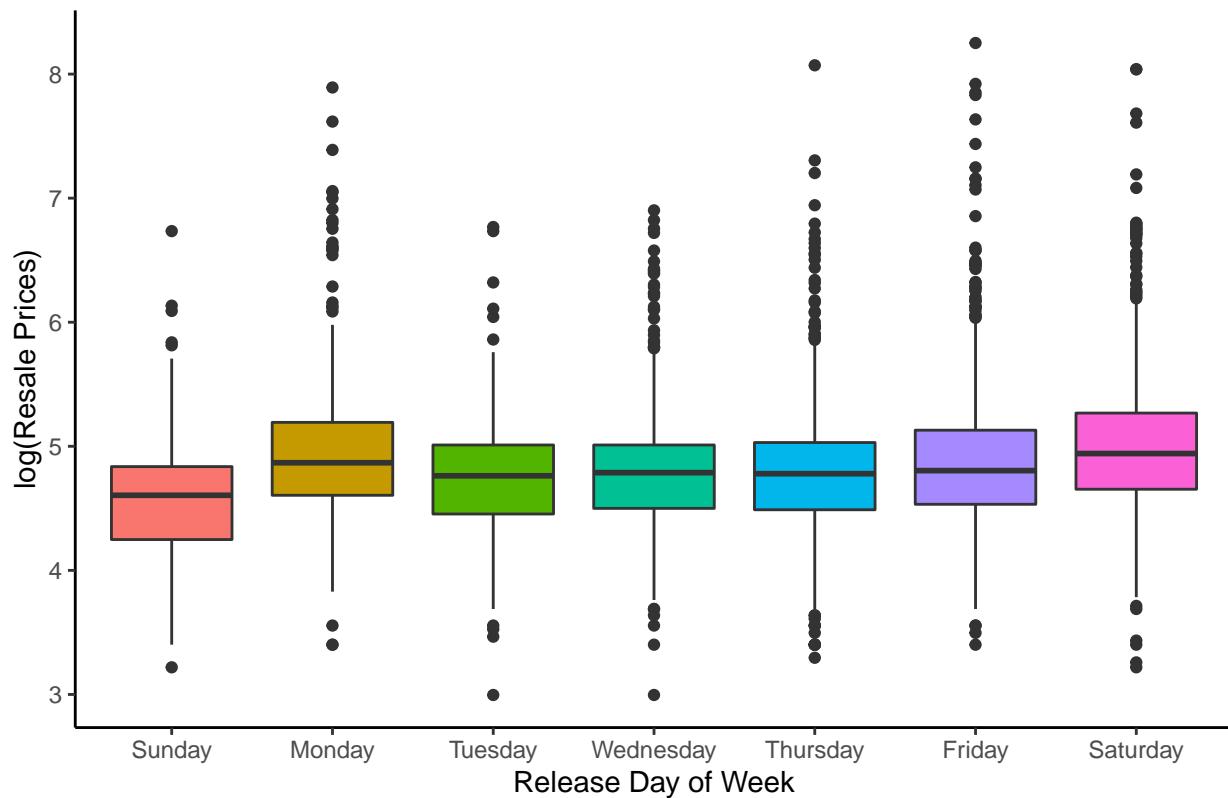
EDA for log resale vs release month

log(Resale Prices) vs Release Month

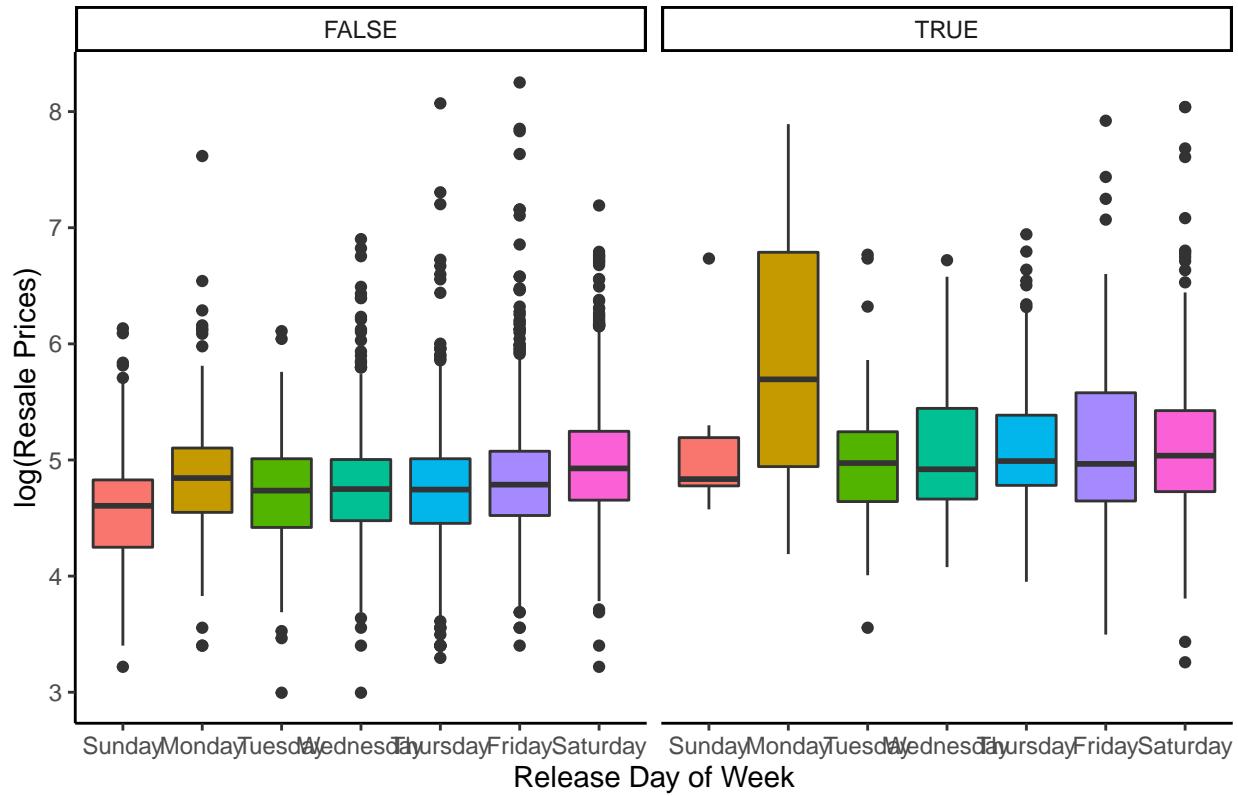


EDA for log resale vs release day

log(Resale Prices) vs Release Day of Week

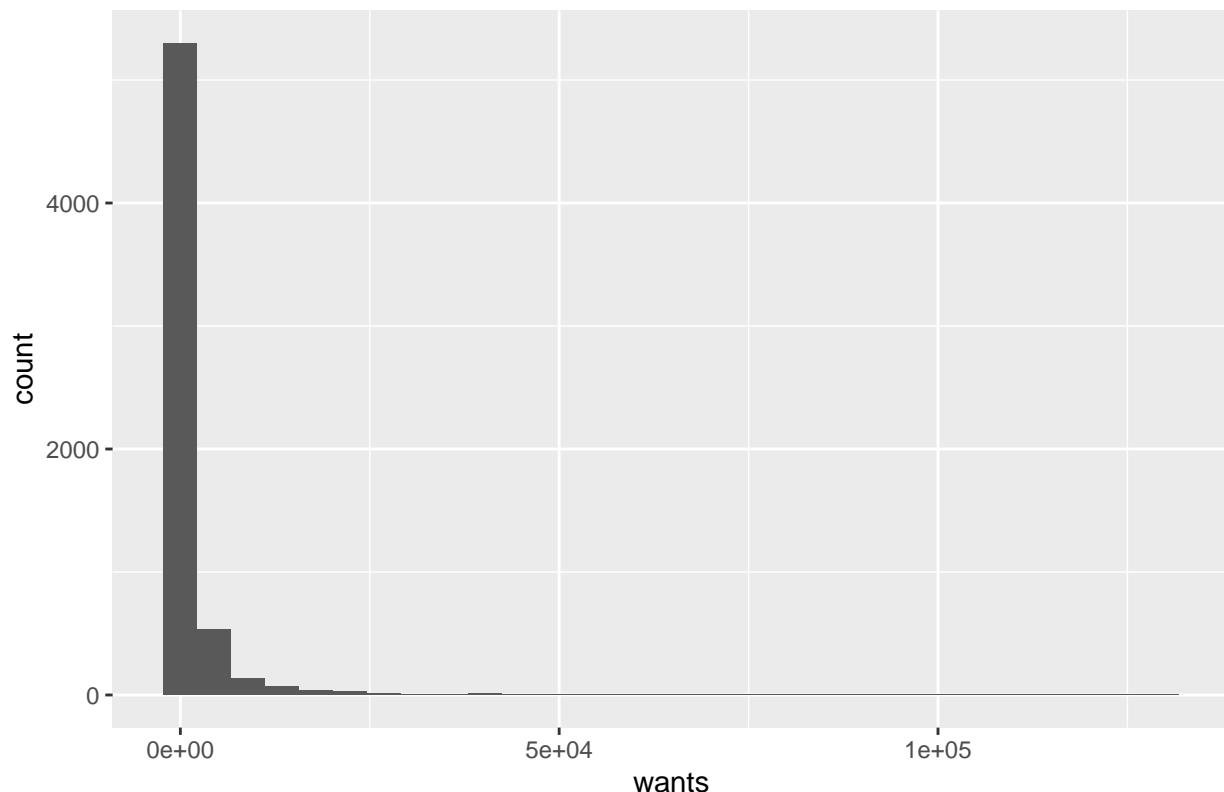


log(Resale Prices) vs Release Day of Week by Collaboration

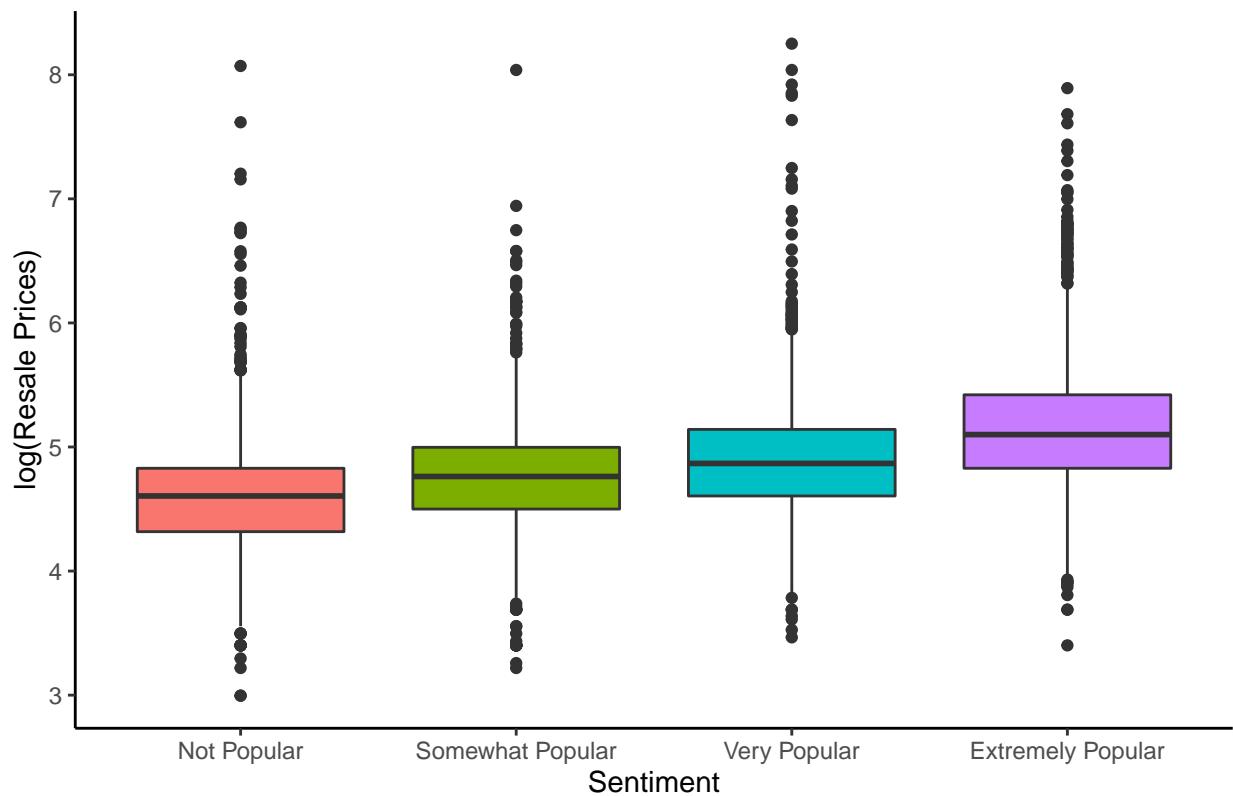


EDA for log resale vs binned “wants”

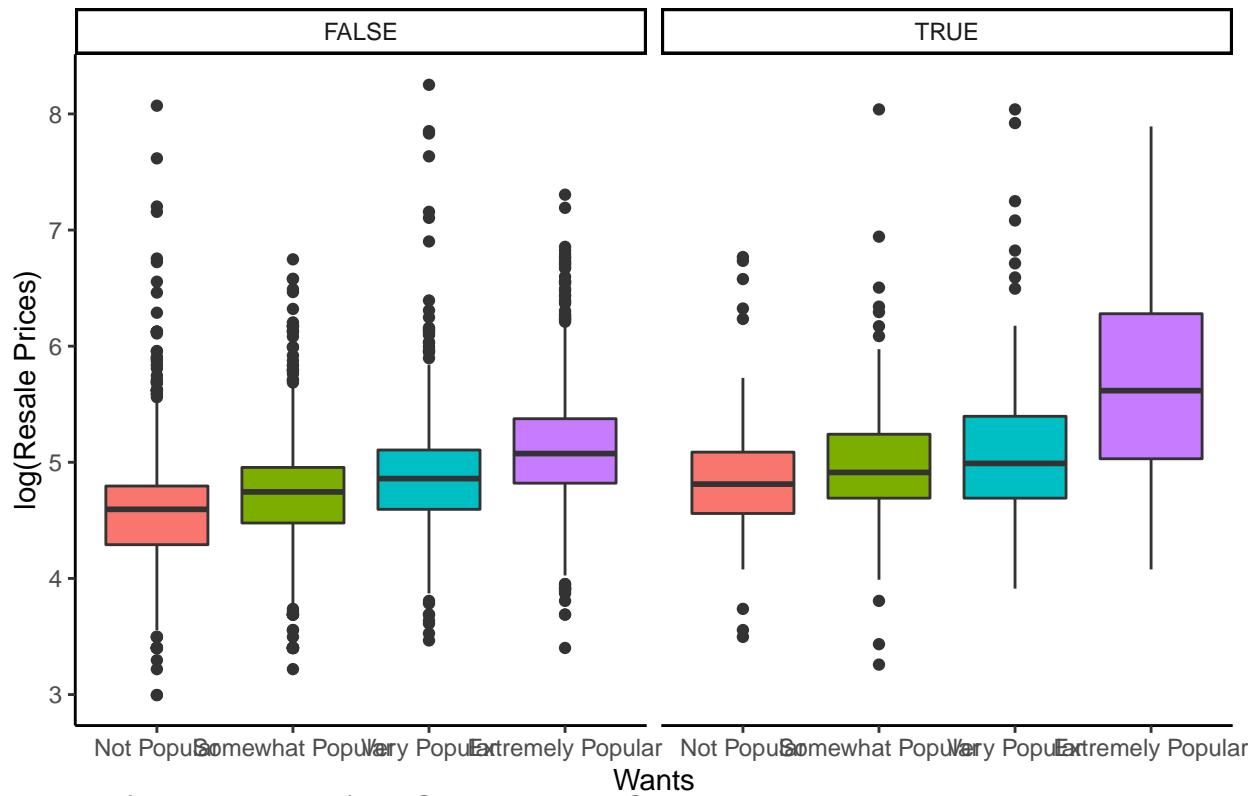
Distribution of Kicks on Fire wants



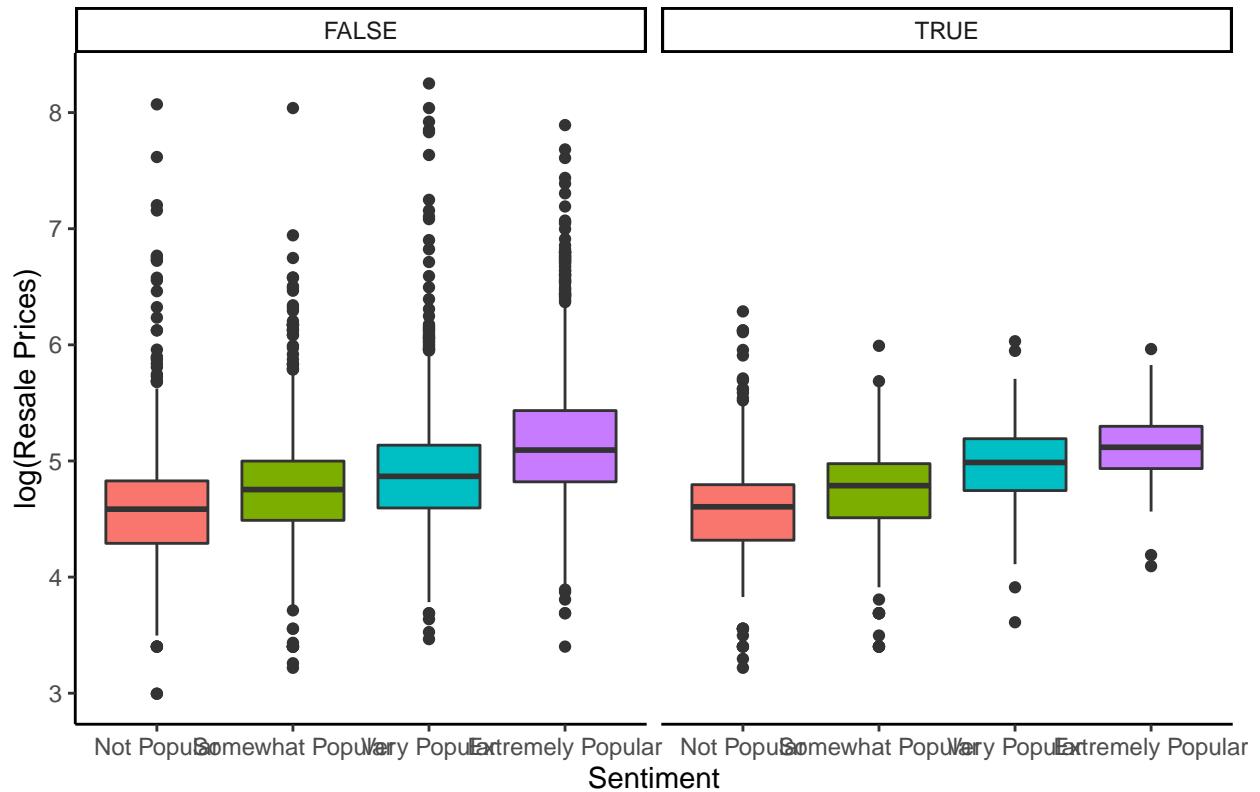
log(Resale Prices) vs Sentiment



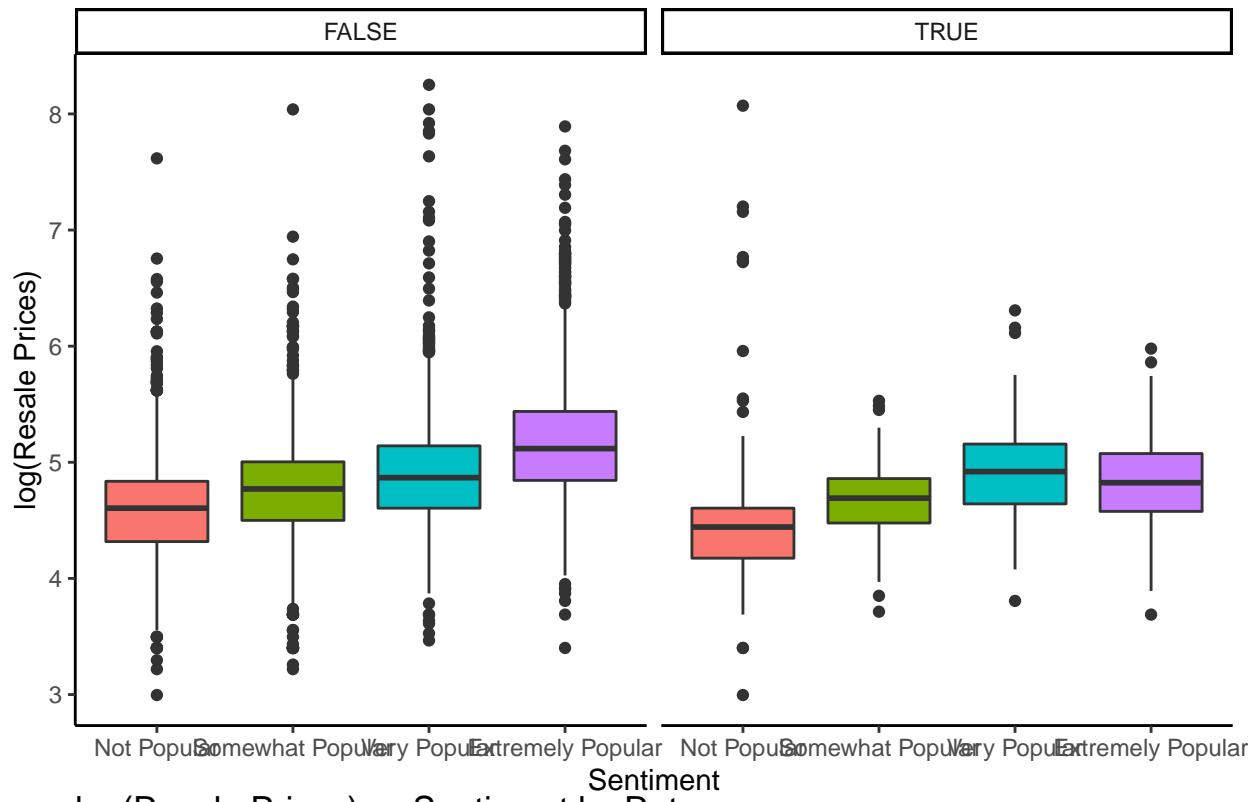
log(Resale Prices) vs Wants (Sentiment) by Collaboration



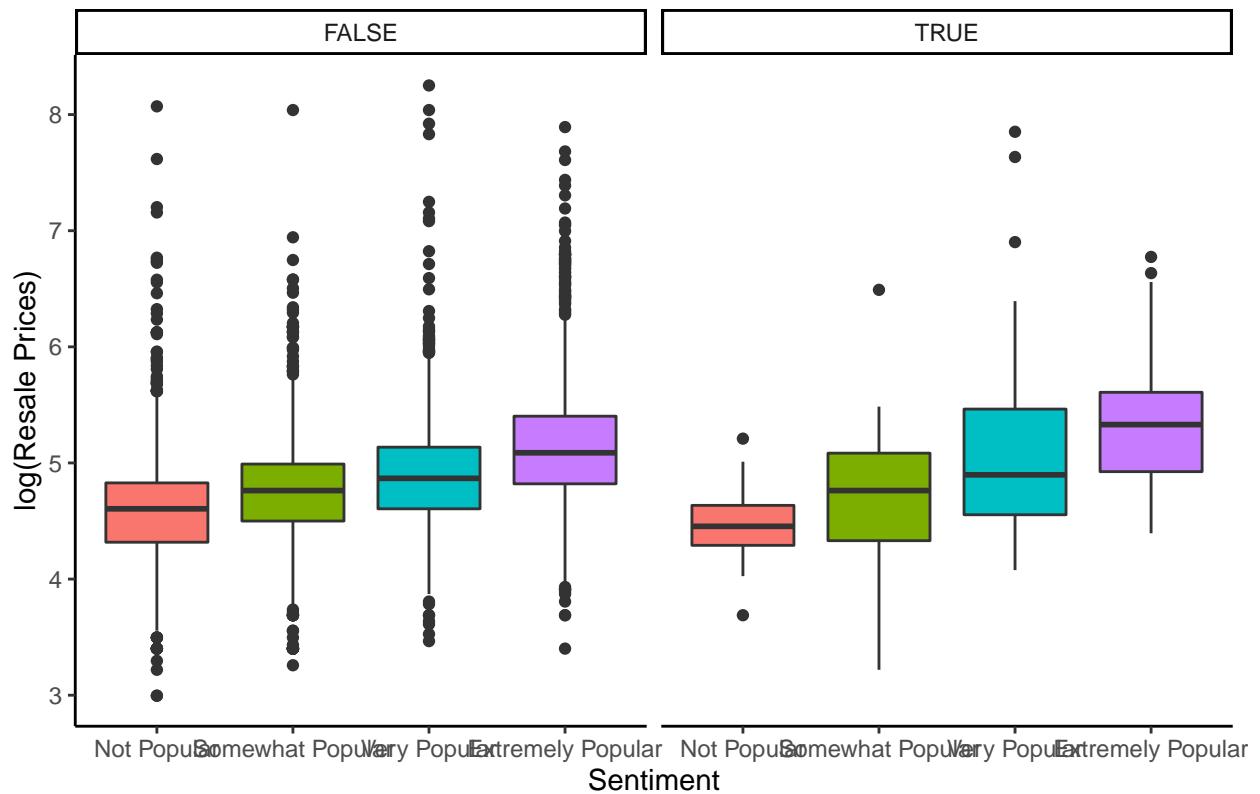
log(Resale Prices) vs Sentiment by Sex



log(Resale Prices) vs Sentiment by Kid's Shoe

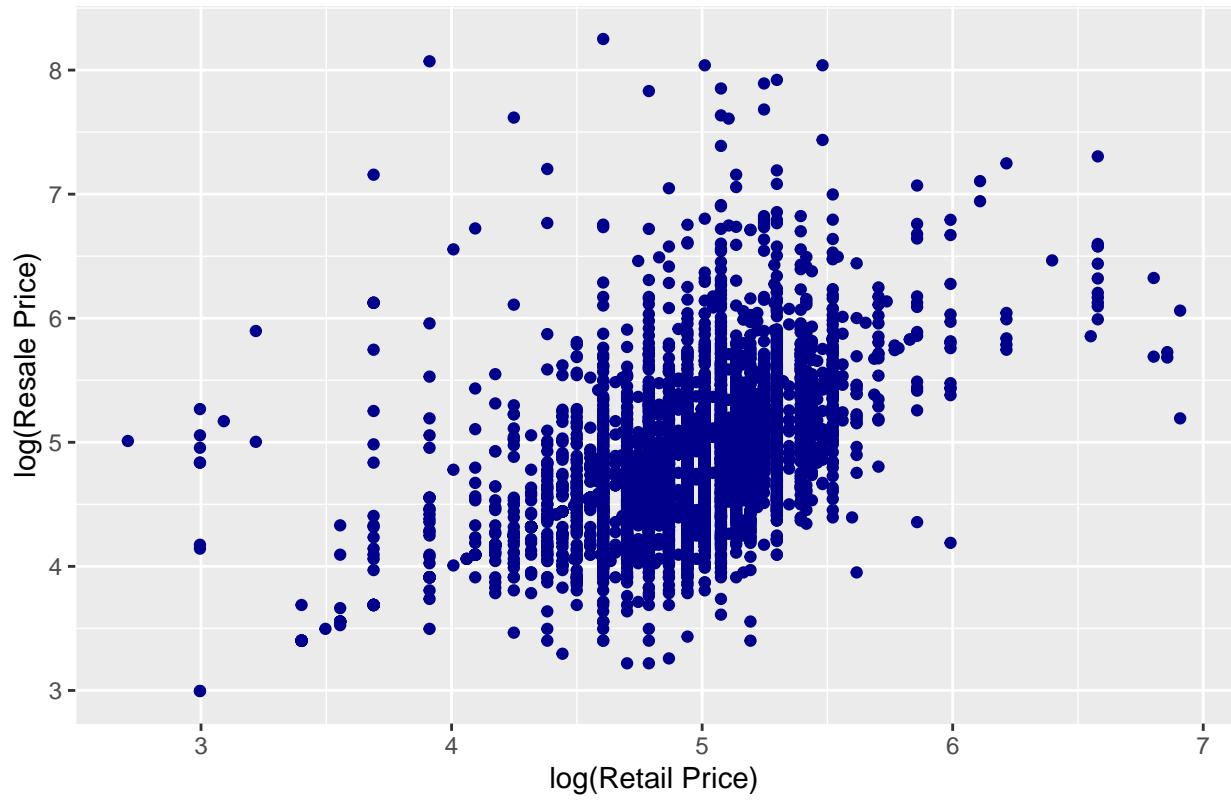


log(Resale Prices) vs Sentiment by Retro

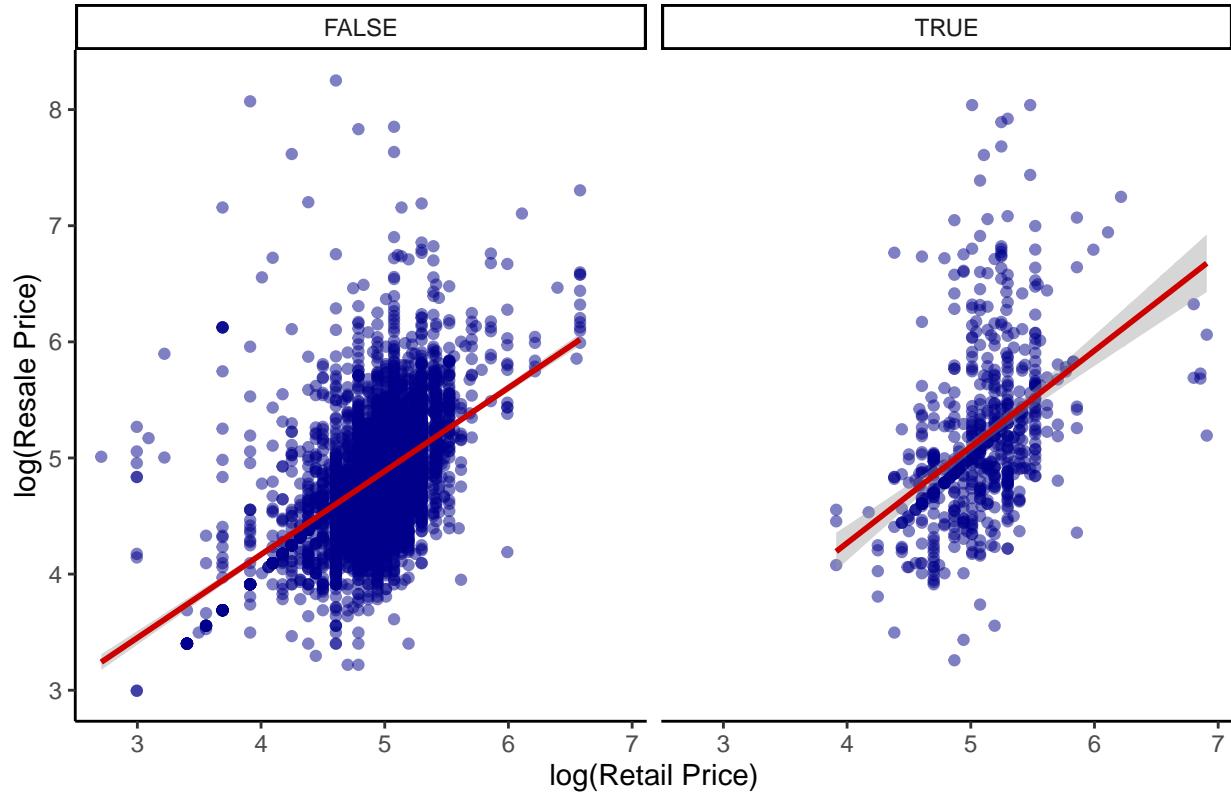


EDA for log resale vs log retail

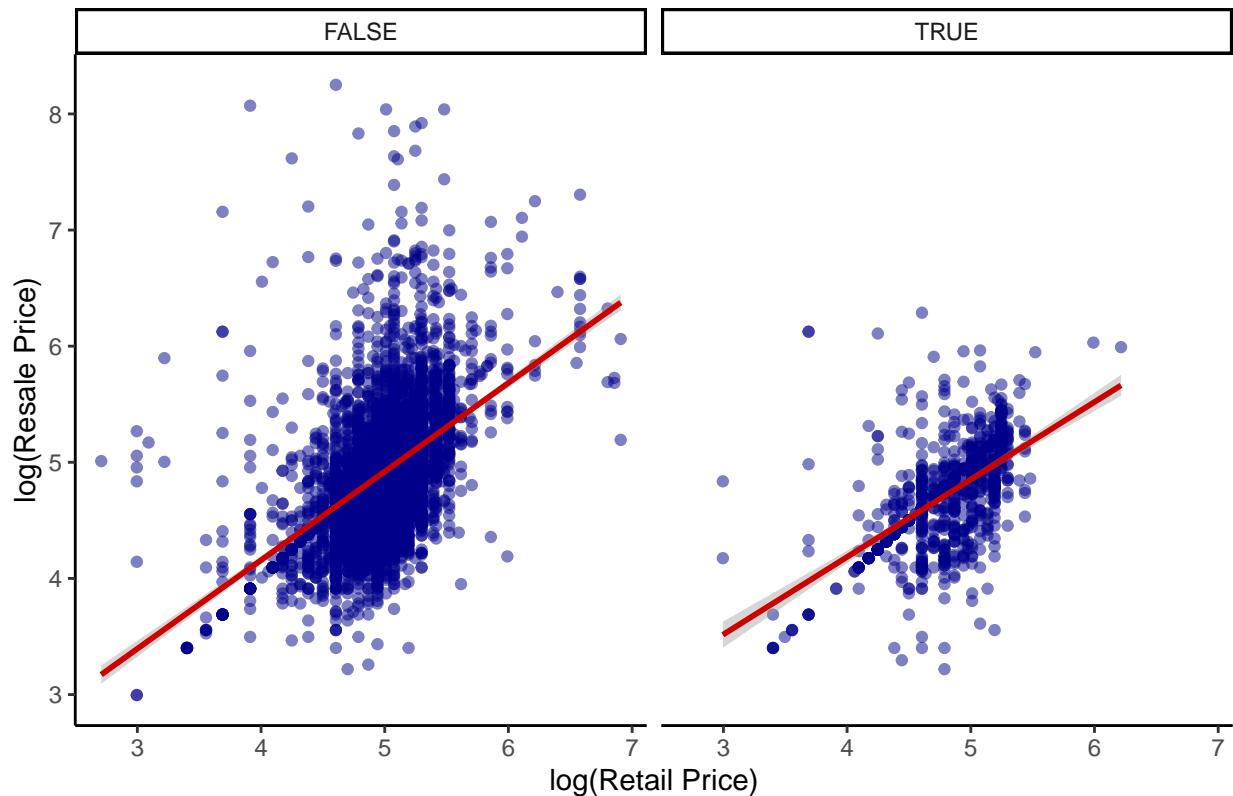
$\log(\text{Resale Price})$ vs $\log(\text{Retail Price})$



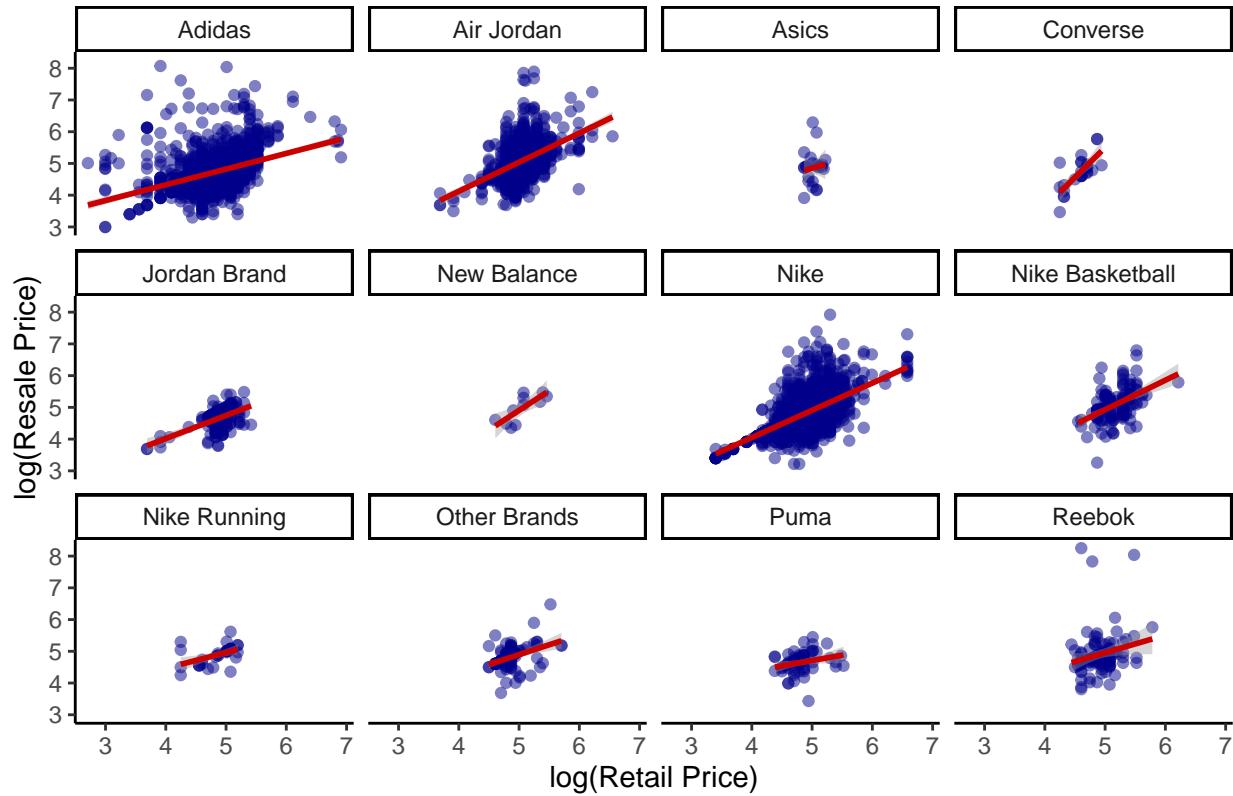
$\log(\text{Resale Price})$ vs $\log(\text{Retail Price})$ by Collab



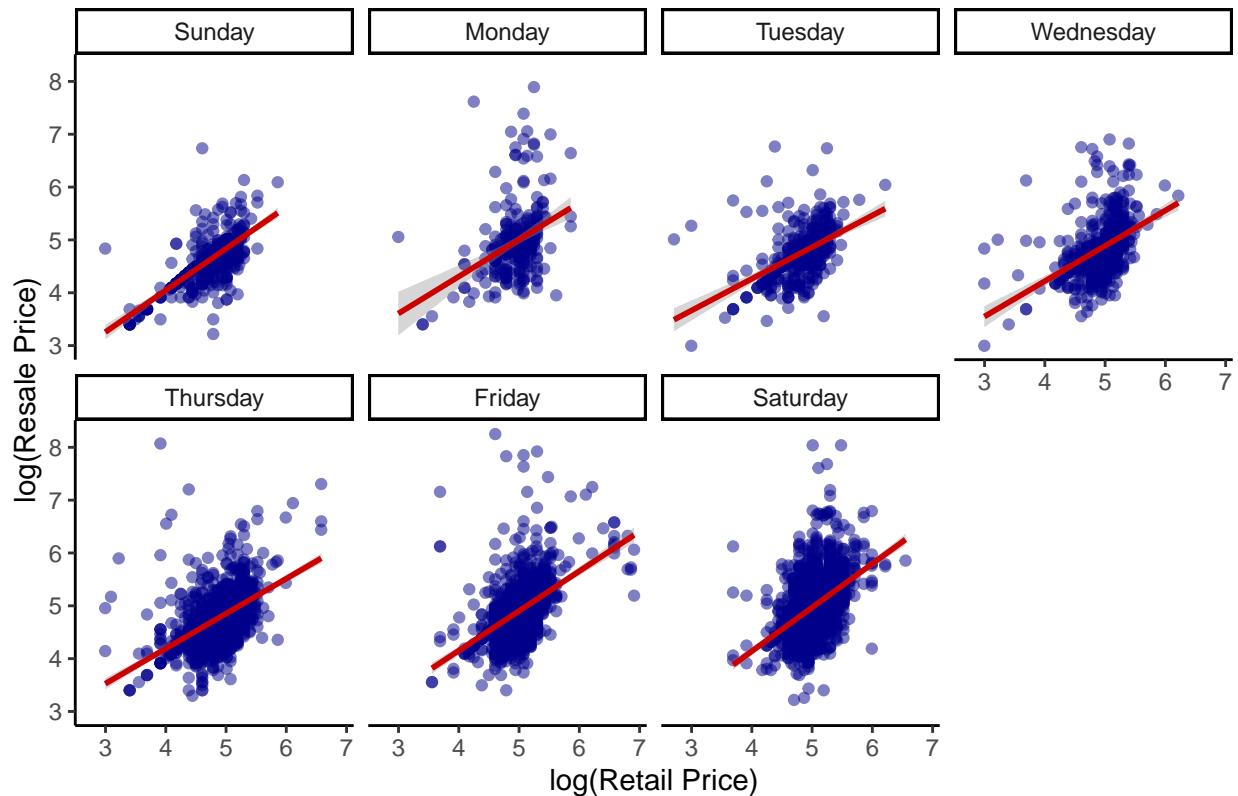
$\log(\text{Resale Price})$ vs $\log(\text{Retail Price})$ by Sex



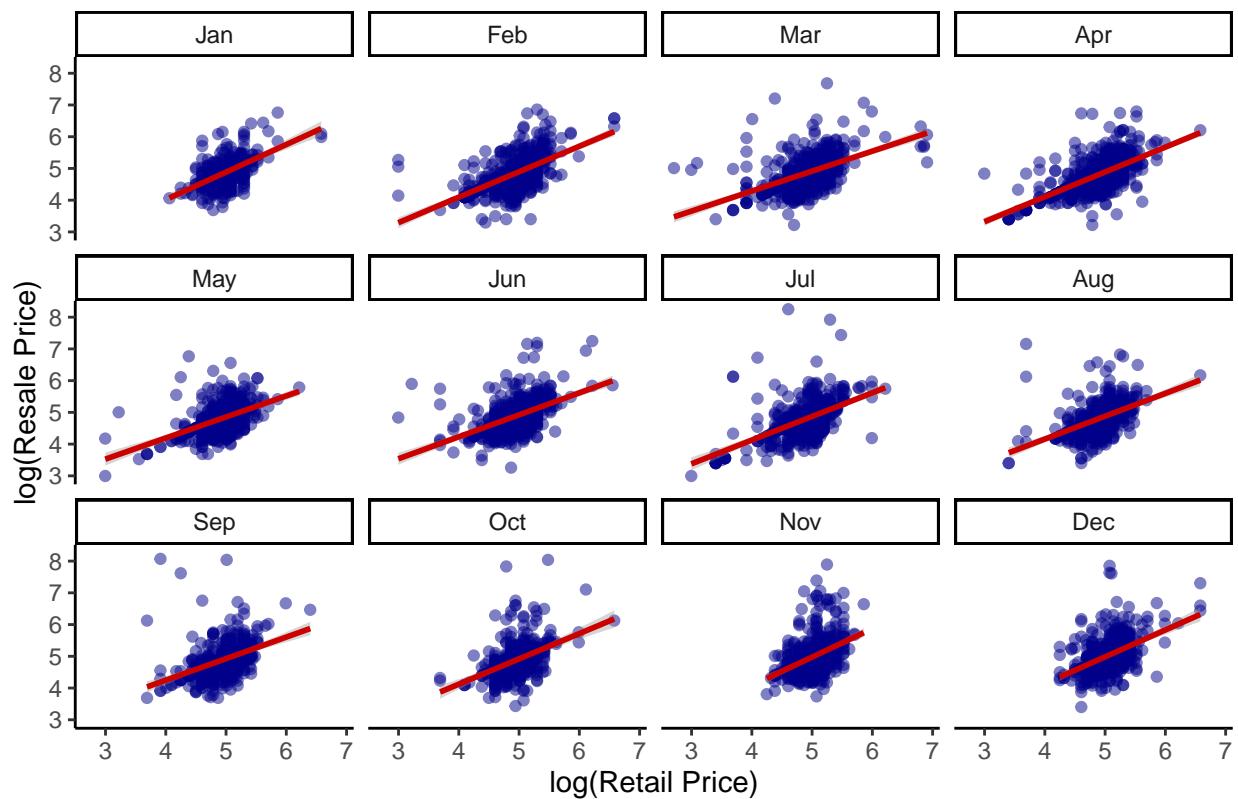
$\log(\text{Resale Price})$ vs $\log(\text{Retail Price})$ by Brand



$\log(\text{Resale Price})$ vs $\log(\text{Retail Price})$ by Release DOW



$\log(\text{Resale Price})$ vs $\log(\text{Retail Price})$ by Release Month



Model

```

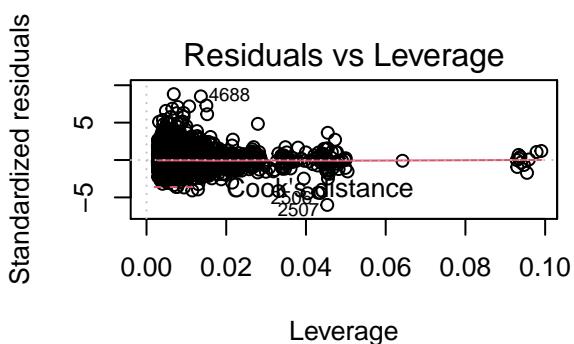
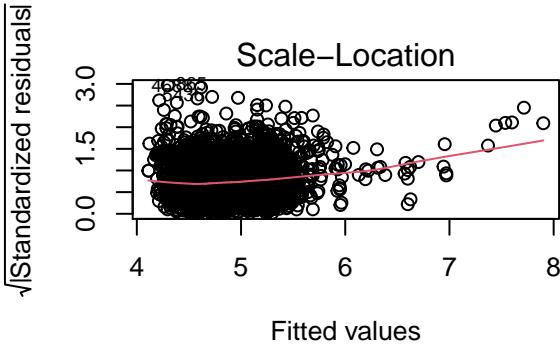
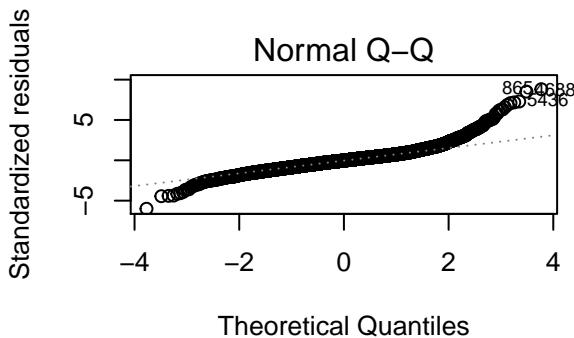
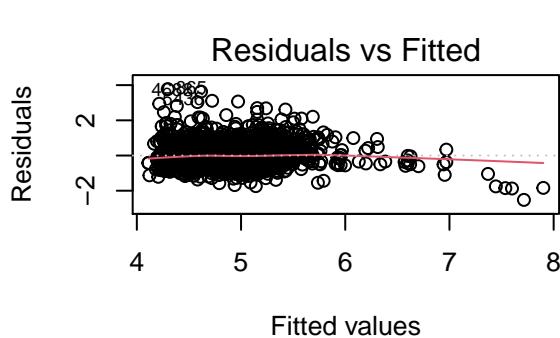
## 
## Call:
## lm(formula = log_resale_price ~ brand + release_month + release_dow +
##      wmns + collab + retro + kids + main_color + bin_wants + retail_price,
##      data = sneakers)
## 
## Residuals:
##    Min      1Q  Median      3Q     Max 
## -2.5217 -0.2455 -0.0107  0.2084  3.7741 
## 
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)    
## (Intercept)                4.0792824  0.0385592 105.793 < 2e-16 ***
## brandAir Jordan            0.1403510  0.0216334   6.488 9.40e-11 ***
## brandAsics                 -0.1597796  0.0901347  -1.773 0.076332 .  
## brandConverse               -0.0131283  0.0877316  -0.150 0.881052  
## brandJordan Brand          -0.0834422  0.0397535  -2.099 0.035859 *  
## brandNew Balance            -0.0980314  0.1314188  -0.746 0.455728  
## brandNike                  0.0523806  0.0144458   3.626 0.000290 *** 
## brandNike Basketball        0.0401751  0.0404242   0.994 0.320342  
## brandNike Running           0.1332712  0.0776873   1.715 0.086308 .  
## brandOther Brands           -0.0214001  0.0455201  -0.470 0.638283  
## brandPuma                  -0.2229885  0.0594071  -3.754 0.000176 *** 
## brandReebok                0.0217633  0.0463381   0.470 0.638612  
## release_monthFeb            0.0214823  0.0297217   0.723 0.469842  
## release_monthMar            0.0553728  0.0296907   1.865 0.062231 .  
## release_monthApr            0.0200584  0.0301602   0.665 0.506036  
## release_monthMay            -0.0313537  0.0315031  -0.995 0.319650  
## release_monthJun            0.0292981  0.0304838   0.961 0.336539  
## release_monthJul            -0.0024515  0.0310468  -0.079 0.937066  
## release_monthAug            0.0223310  0.0307258   0.727 0.467386  
## release_monthSep            0.0661192  0.0317232   2.084 0.037178 *  
## release_monthOct            0.0424801  0.0324080   1.311 0.189978  
## release_monthNov            0.0910831  0.0306954   2.967 0.003016 ** 
## release_monthDec            0.0709438  0.0310805   2.283 0.022489 *  
## release_dowMonday           0.1773772  0.0358024   4.954 7.45e-07 *** 
## release_dowTuesday          0.0686351  0.0332976   2.061 0.039320 *  
## release_dowWednesday        0.0626654  0.0306779   2.043 0.041126 *  
## release_dowThursday          0.0471950  0.0270069   1.748 0.080598 .  
## release_dowFriday            0.0443193  0.0283175   1.565 0.117614  
## release_dowSaturday          0.0783300  0.0276095   2.837 0.004568 ** 
## wmnsTRUE                    0.0331839  0.0164615   2.016 0.043860 *  
## collabTRUE                  0.2660243  0.0196380  13.546 < 2e-16 *** 
## retroTRUE                   0.1481206  0.0330190   4.486 7.39e-06 *** 
## kidsTRUE                     -0.0635748  0.0228878  -2.778 0.005492 ** 
## main_colorBlue               0.0018315  0.0165285   0.111 0.911770  
## main_colorBrown              -0.0623182  0.0355700  -1.752 0.079825 .  
## main_colorGray                -0.0096130  0.0280403  -0.343 0.731741  
## main_colorGreen               0.0159876  0.0376303   0.425 0.670954  
## main_colorMulti-Color         0.0612667  0.0401180   1.527 0.126772  
## main_colorOrange              -0.0287045  0.0356582  -0.805 0.420856  
## main_colorPurple              -0.0219321  0.0354176  -0.619 0.535780  
## main_colorRed                 0.0214855  0.0234209   0.917 0.358989  
## main_colorWhite               0.0266488  0.0145803   1.828 0.067638 . 

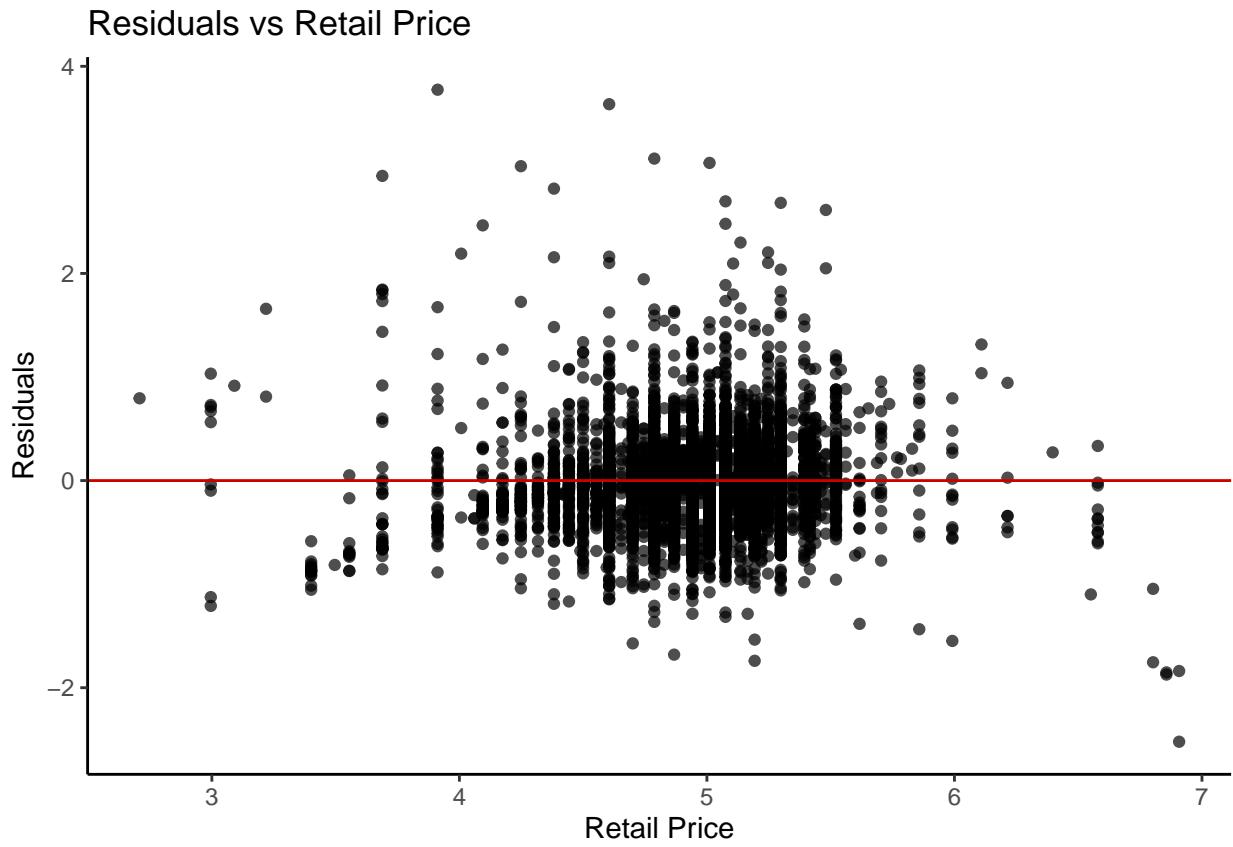
```

```

## main_colorYellow          -0.0998767  0.0659459 -1.515 0.129944
## bin_wantsSomewhat Popular 0.0126271  0.0170421  0.741 0.458763
## bin_wantsVery Popular    0.1147260  0.0176036  6.517 7.74e-11 ***
## bin_wantsExtremely Popular 0.3037893  0.0192095 15.815 < 2e-16 ***
## retail_price              0.0033194  0.0001017 32.633 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4298 on 6117 degrees of freedom
## Multiple R-squared:  0.3494, Adjusted R-squared:  0.3445
## F-statistic: 71.4 on 46 and 6117 DF,  p-value: < 2.2e-16

```





```

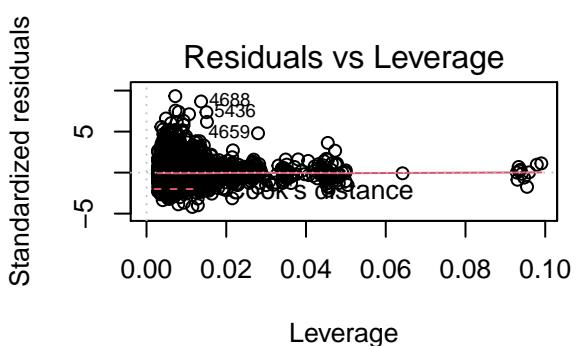
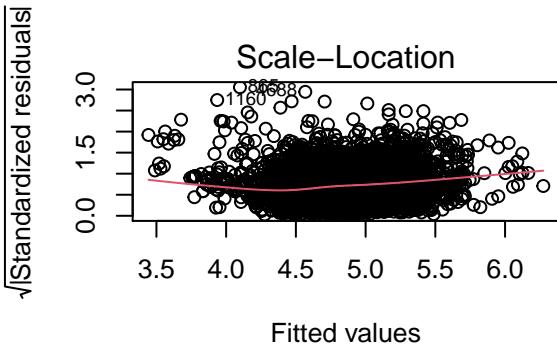
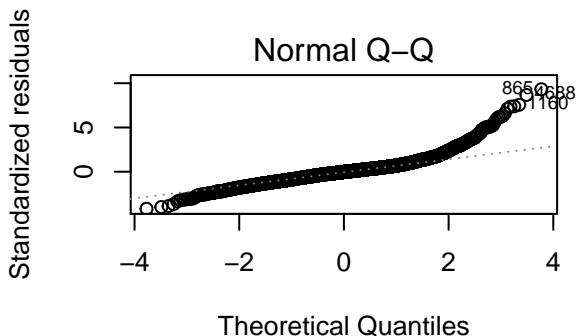
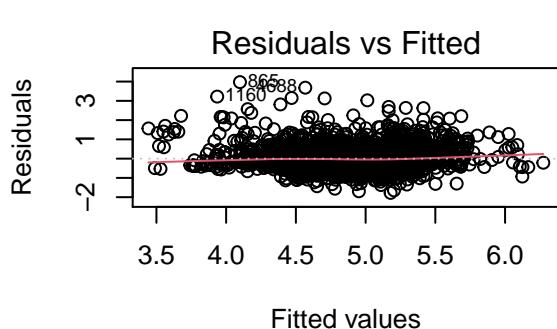
## 
## Call:
## lm(formula = log_resale_price ~ brand + release_month + release_dow +
##      wmns + collab + retro + kids + main_color + bin_wants + log_retail_price,
##      data = sneakers)
##
## Residuals:
##    Min      1Q  Median      3Q     Max 
## -1.7783 -0.2377 -0.0097  0.1857  3.9719 
##
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)    
## (Intercept)                1.686911  0.089893 18.766 < 2e-16 ***
## brandAir Jordan            0.113248  0.021603  5.242 1.64e-07 ***
## brandAsics                 -0.200110  0.089656 -2.232 0.025652 *  
## brandConverse               0.020547  0.087356  0.235 0.814054  
## brandJordan Brand          -0.098477  0.039542 -2.490 0.012786 *  
## brandNew Balance            -0.123857  0.130756 -0.947 0.343554  
## brandNike                  0.040374  0.014372  2.809 0.004982 ** 
## brandNike Basketball        0.021146  0.040244  0.525 0.599295  
## brandNike Running            0.140815  0.077306  1.822 0.068574 .  
## brandOther Brands           -0.027090  0.045276 -0.598 0.549648  
## brandPuma                  -0.218746  0.059111 -3.701 0.000217 *** 
## brandReebok                 0.004719  0.046078  0.102 0.918427  
## release_monthFeb             0.027915  0.029574  0.944 0.345255  
## release_monthMar             0.072354  0.029539  2.449 0.014334 *  
## release_monthApr              0.027865  0.030012  0.928 0.353194  
## release_monthMay              -0.027424  0.031348 -0.875 0.381706  
## release_monthJun              0.041084  0.030342  1.354 0.175780  
## release_monthJul              0.009847  0.030901  0.319 0.750007  
## release_monthAug              0.023808  0.030573  0.779 0.436170  
## release_monthSep              0.066245  0.031565  2.099 0.035884 *  
## release_monthOct              0.041892  0.032246  1.299 0.193949  
## release_monthNov              0.080164  0.030542  2.625 0.008693 ** 
## release_monthDec              0.070657  0.030926  2.285 0.022362 *  
## release_dowMonday             0.148086  0.035665  4.152 3.34e-05 *** 
## release_dowTuesday            0.053595  0.033142  1.617 0.105901  
## release_dowWednesday          0.038266  0.030548  1.253 0.210373  
## release_dowThursday            0.020888  0.026910  0.776 0.437654  
## release_dowFriday              0.030982  0.028200  1.099 0.271962  
## release_dowSaturday            0.049302  0.027518  1.792 0.073235 .  
## wmnsTRUE                      0.029162  0.016375  1.781 0.074975 .  
## collabTRUE                     0.272387  0.019503 13.966 < 2e-16 *** 
## retroTRUE                      0.147183  0.032850  4.481 7.58e-06 *** 
## kidsTRUE                       -0.015373  0.023028 -0.668 0.504436  
## main_colorBlue                 -0.002759  0.016447 -0.168 0.866763  
## main_colorBrown                -0.044499  0.035362 -1.258 0.208307  
## main_colorGray                 -0.028693  0.027914 -1.028 0.304033  
## main_colorGreen                 0.008407  0.037442  0.225 0.822342  
## main_colorMulti-Color          0.062279  0.039917  1.560 0.118761  
## main_colorOrange                -0.031986  0.035482 -0.901 0.367373  
## main_colorPurple                -0.024294  0.035242 -0.689 0.490634  
## main_colorRed                  0.020981  0.023304  0.900 0.367993  
## main_colorWhite                 0.023514  0.014504  1.621 0.105040

```

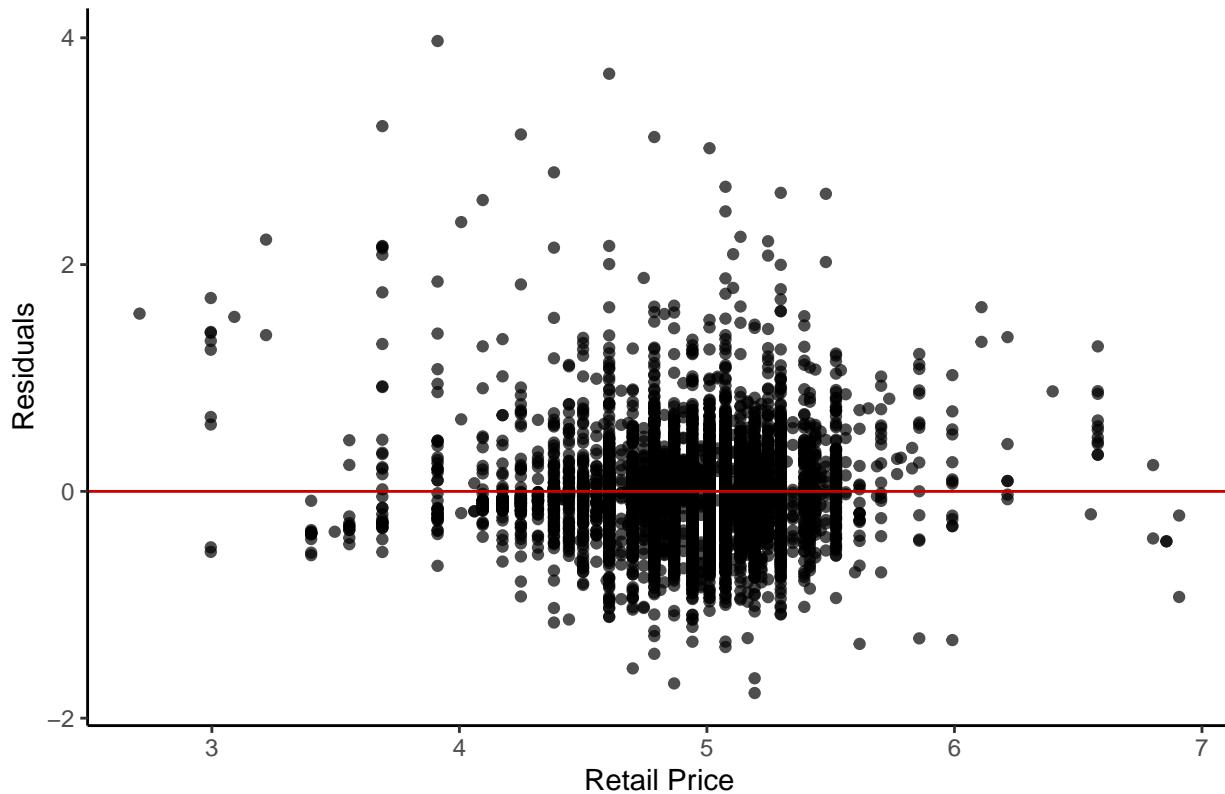
```

## main_colorYellow          -0.110867  0.065620  -1.690 0.091169 .
## bin_wantsSomewhat Popular -0.031493  0.017210  -1.830 0.067315 .
## bin_wantsVery Popular     0.053276  0.017934   2.971 0.002982 **
## bin_wantsExtremely Popular 0.242763  0.019599  12.387 < 2e-16 ***
## log_retail_price          0.598942  0.017763  33.719 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4276 on 6117 degrees of freedom
## Multiple R-squared:  0.3558, Adjusted R-squared:  0.351
## F-statistic: 73.46 on 46 and 6117 DF,  p-value: < 2.2e-16

```



Residuals vs Retail Price



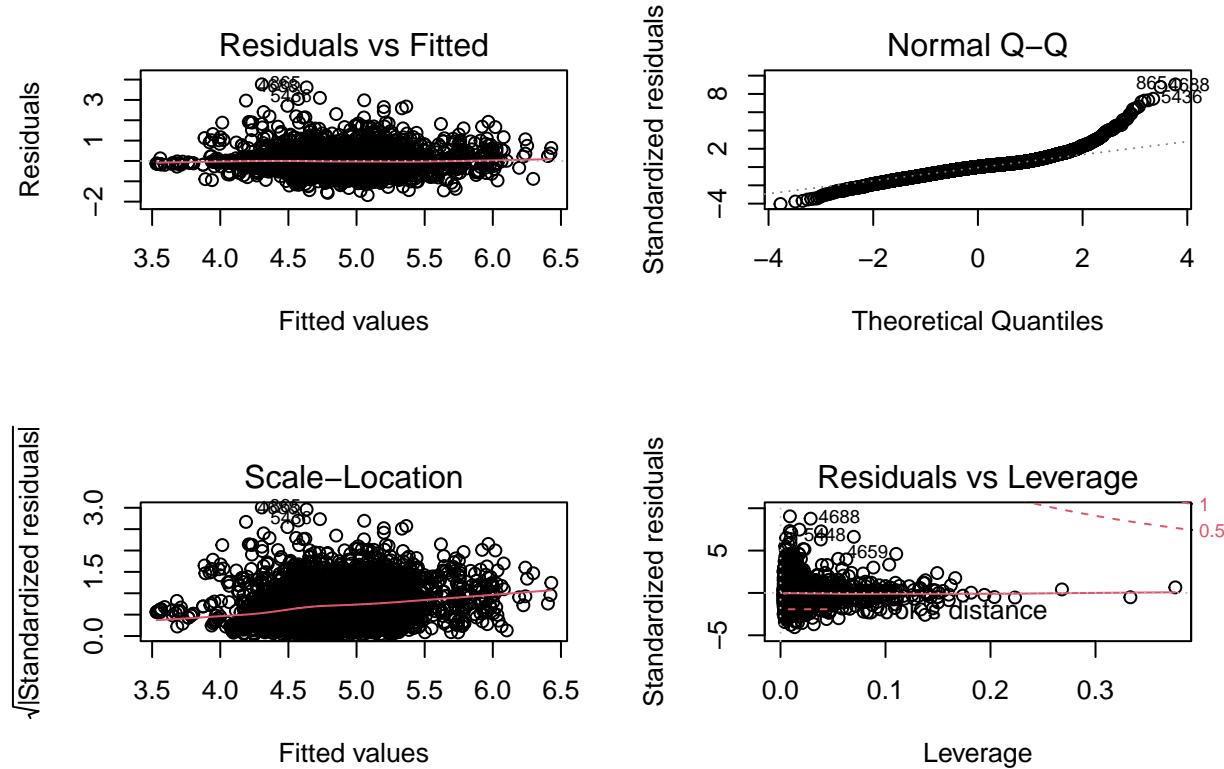
```
##
## Call:
## lm(formula = log_resale_price ~ brand + release_month + release_dow +
##     wmn + collab + retro + kids + main_color + bin_wants + log_retail_price +
##     bin_wants:collab + log_retail_price:brand + collab:main_color,
##     data = sneakers)
##
## Residuals:
##      Min       1Q   Median       3Q      Max 
## -1.6802 -0.2265  0.0077  0.1738  3.7662 
## 
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)    
## (Intercept)                2.722025  0.130994 20.780 < 2e-16 ***
## brandAir Jordan          -1.473625  0.279543 -5.272 1.40e-07 ***
## brandAsics                  5.829293  3.999498  1.458  0.14503  
## brandConverse             -3.882669  1.913258 -2.029  0.04247 *  
## brandJordan Brand        -1.019329  0.656250 -1.553  0.12041  
## brandNew Balance         -3.774932  2.526902 -1.494  0.13525  
## brandNike                 -1.785393  0.162617 -10.979 < 2e-16 ***
## brandNike Basketball     -2.129501  0.724786 -2.938  0.00331 ** 
## brandNike Running          -0.979368  1.224182 -0.800  0.42373  
## brandOther Brands          0.042078  0.901270  0.047  0.96276  
## brandPuma                  0.059702  1.064690  0.056  0.95528  
## brandReebok              -0.216155  0.826933 -0.261  0.79380  
## release_monthFeb           0.026353  0.028997  0.909  0.36349  
## release_monthMar          0.078751  0.028974  2.718  0.00659 **
```

## release_monthApr	0.024644	0.029415	0.838	0.40219
## release_monthMay	-0.019829	0.030754	-0.645	0.51910
## release_monthJun	0.041338	0.029781	1.388	0.16516
## release_monthJul	0.016787	0.030345	0.553	0.58014
## release_monthAug	0.026235	0.029991	0.875	0.38174
## release_monthSep	0.068583	0.030940	2.217	0.02668 *
## release_monthOct	0.040194	0.031619	1.271	0.20370
## release_monthNov	0.087263	0.029958	2.913	0.00359 **
## release_monthDec	0.082666	0.030369	2.722	0.00651 **
## release_dowMonday	0.100859	0.035154	2.869	0.00413 **
## release_dowTuesday	0.022550	0.032794	0.688	0.49172
## release_dowWednesday	0.025127	0.030058	0.836	0.40322
## release_dowThursday	-0.010973	0.026615	-0.412	0.68014
## release_dowFriday	0.009132	0.027837	0.328	0.74288
## release_dowSaturday	0.035923	0.027096	1.326	0.18497
## wmnstTRUE	0.026282	0.016063	1.636	0.10185
## collabTRUE	0.071658	0.056392	1.271	0.20388
## retroTRUE	0.162027	0.032354	5.008	5.66e-07 ***
## kidsTRUE	-0.015392	0.022871	-0.673	0.50096
## main_colorBlue	0.006201	0.017030	0.364	0.71576
## main_colorBrown	-0.027372	0.038186	-0.717	0.47352
## main_colorGray	-0.009841	0.028099	-0.350	0.72618
## main_colorGreen	-0.002170	0.038621	-0.056	0.95519
## main_colorMulti-Color	0.083314	0.042578	1.957	0.05042 .
## main_colorOrange	-0.062806	0.038431	-1.634	0.10226
## main_colorPurple	-0.029296	0.036978	-0.792	0.42824
## main_colorRed	0.008396	0.023833	0.352	0.72463
## main_colorWhite	0.014741	0.015004	0.982	0.32591
## main_colorYellow	-0.097213	0.073038	-1.331	0.18324
## bin_wantsSomewhat Popular	-0.024841	0.017630	-1.409	0.15889
## bin_wantsVery Popular	0.049457	0.018301	2.702	0.00690 **
## bin_wantsExtremely Popular	0.177199	0.019965	8.876	< 2e-16 ***
## log_retail_price	0.392191	0.026351	14.883	< 2e-16 ***
## collabTRUE:bin_wantsSomewhat Popular	0.119931	0.059272	2.023	0.04308 *
## collabTRUE:bin_wantsVery Popular	0.112029	0.058509	1.915	0.05558 .
## collabTRUE:bin_wantsExtremely Popular	0.524896	0.061577	8.524	< 2e-16 ***
## brandAir Jordan:log_retail_price	0.323806	0.055380	5.847	5.26e-09 ***
## brandAsics:log_retail_price	-1.194097	0.796247	-1.500	0.13376
## brandConverse:log_retail_price	0.838467	0.418115	2.005	0.04497 *
## brandJordan Brand:log_retail_price	0.189860	0.134195	1.415	0.15717
## brandNew Balance:log_retail_price	0.735342	0.499897	1.471	0.14135
## brandNike:log_retail_price	0.373645	0.033337	11.208	< 2e-16 ***
## brandNike Basketball:log_retail_price	0.435210	0.140664	3.094	0.00198 **
## brandNike Running:log_retail_price	0.232153	0.252051	0.921	0.35706
## brandOther Brands:log_retail_price	-0.012741	0.184963	-0.069	0.94509
## brandPuma:log_retail_price	-0.063721	0.220288	-0.289	0.77239
## brandReebok:log_retail_price	0.050249	0.167932	0.299	0.76478
## collabTRUE:main_colorBlue	-0.086387	0.053453	-1.616	0.10612
## collabTRUE:main_colorBrown	-0.025852	0.091344	-0.283	0.77717
## collabTRUE:main_colorGray	-0.334800	0.124236	-2.695	0.00706 **
## collabTRUE:main_colorGreen	0.134577	0.123672	1.088	0.27656
## collabTRUE:main_colorMulti-Color	-0.087244	0.108713	-0.803	0.42229
## collabTRUE:main_colorOrange	0.160857	0.091839	1.752	0.07991 .
## collabTRUE:main_colorPurple	0.055075	0.105454	0.522	0.60151

```

## collabTRUE:main_colorRed          0.070942  0.083420  0.850  0.39513
## collabTRUE:main_colorWhite        0.110080  0.047026  2.341  0.01927 *
## collabTRUE:main_colorYellow       0.045307  0.155297  0.292  0.77049
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4186 on 6093 degrees of freedom
## Multiple R-squared:  0.3851, Adjusted R-squared:  0.378
## F-statistic: 54.51 on 70 and 6093 DF,  p-value: < 2.2e-16

```



```

## Analysis of Variance Table
##
## Model 1: log_resale_price ~ brand + release_month + release_dow + wmnss +
##           collab + retro + kids + main_color + bin_wants + log_retail_price
## Model 2: log_resale_price ~ brand + release_month + release_dow + wmnss +
##           collab + retro + kids + main_color + bin_wants + log_retail_price +
##           bin_wants:collab + log_retail_price:brand + collab:main_color
##   Res.Df   RSS Df Sum of Sq    F    Pr(>F)
## 1   6117 1118.6
## 2   6093 1067.8 24      50.809 12.08 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Call:
## lm(formula = log_resale_price ~ collab + log_retail_price + bin_wants +
##     brand + retro + release_month + release_dow + wmnss + collab:bin_wants +
##     log_retail_price:brand, data = sneakers)

```

```

## 
## Residuals:
##   Min     1Q Median     3Q    Max
## -1.6163 -0.2313  0.0087  0.1751  3.7529
## 
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                2.733536  0.129370 21.130 < 2e-16 ***
## collabTRUE                  0.114659  0.049252  2.328  0.01994 *
## log_retail_price              0.389646  0.026034 14.967 < 2e-16 ***
## bin_wantsSomewhat Popular   -0.023223  0.017589 -1.320  0.18677
## bin_wantsVery Popular        0.052436  0.018223  2.878  0.00402 **
## bin_wantsExtremely Popular   0.180985  0.019853  9.116 < 2e-16 ***
## brandAir Jordan             -1.500470  0.276037 -5.436 5.67e-08 ***
## brandAsics                   5.534953  3.993674  1.386  0.16582
## brandConverse                 -4.169570  1.911670 -2.181  0.02921 *
## brandJordan Brand            -1.045891  0.656973 -1.592  0.11144
## brandNew Balance              -4.481266  2.523946 -1.775  0.07587 .
## brandNike                     -1.793524  0.162459 -11.040 < 2e-16 ***
## brandNike Basketball          -2.197946  0.724823 -3.032  0.00244 **
## brandNike Running              -0.983794  1.224816 -0.803  0.42188
## brandOther Brands              0.041601  0.897408  0.046  0.96303
## brandPuma                      0.375869  1.056407  0.356  0.72200
## brandReebok                   -0.319454  0.824582 -0.387  0.69846
## retroTRUE                     0.163526  0.032267  5.068 4.14e-07 ***
## release_monthFeb               0.027853  0.028986  0.961  0.33663
## release_monthMar               0.077363  0.028946  2.673  0.00755 **
## release_monthApr               0.026515  0.029396  0.902  0.36710
## release_monthMay               -0.019191  0.030739 -0.624  0.53242
## release_monthJun               0.041827  0.029781  1.404  0.16022
## release_monthJul               0.017751  0.030354  0.585  0.55872
## release_monthAug               0.025042  0.030003  0.835  0.40394
## release_monthSep               0.069895  0.030961  2.258  0.02401 *
## release_monthOct               0.039128  0.031611  1.238  0.21584
## release_monthNov               0.085086  0.029963  2.840  0.00453 **
## release_monthDec               0.082409  0.030361  2.714  0.00666 **
## release_dowMonday              0.105823  0.035145  3.011  0.00261 **
## release_dowTuesday              0.022403  0.032776  0.684  0.49430
## release_dowWednesday            0.021926  0.030088  0.729  0.46620
## release_dowThursday              -0.009759  0.026616 -0.367  0.71387
## release_dowFriday               0.007491  0.027830  0.269  0.78782
## release_dowSaturday              0.034916  0.027094  1.289  0.19755
## wmnstrue                      0.026267  0.015809  1.662  0.09665 .
## collabTRUE:bin_wantsSomewhat Popular 0.093380  0.058934  1.584  0.11314
## collabTRUE:bin_wantsVery Popular  0.084190  0.058063  1.450  0.14712
## collabTRUE:bin_wantsExtremely Popular 0.508422  0.061075  8.325 < 2e-16 ***
## log_retail_price:brandAir Jordan  0.328881  0.054844  5.997 2.13e-09 ***
## log_retail_price:brandAsics      -1.136952  0.795104 -1.430  0.15279
## log_retail_price:brandConverse   0.906474  0.417630  2.171  0.03001 *
## log_retail_price:brandJordan Brand 0.195821  0.134331  1.458  0.14496
## log_retail_price:brandNew Balance 0.874204  0.499361  1.751  0.08006 .
## log_retail_price:brandNike       0.375747  0.033291 11.287 < 2e-16 ***
## log_retail_price:brandNike Basketball 0.447987  0.140705  3.184  0.00146 **
## log_retail_price:brandNike Running  0.232884  0.252175  0.923  0.35578

```

```

## log_retail_price:brandOther Brands -0.012604 0.184143 -0.068 0.94543
## log_retail_price:brandPuma -0.132029 0.218608 -0.604 0.54590
## log_retail_price:brandReebok 0.068942 0.167460 0.412 0.68058
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4194 on 6114 degrees of freedom
## Multiple R-squared: 0.3807, Adjusted R-squared: 0.3757
## F-statistic: 76.7 on 49 and 6114 DF, p-value: < 2.2e-16

##
## Call:
## lm(formula = log_resale_price ~ collab + log_retail_price + bin_wants +
##     retro + collab:bin_wants, data = sneakers)
##
## Residuals:
##    Min      1Q  Median      3Q      Max 
## -1.7486 -0.2353  0.0000  0.1787  3.9516 
##
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)    
## (Intercept)                1.63925   0.07945 20.632 < 2e-16 ***
## collabTRUE                 0.07159   0.04964  1.442 0.149312  
## log_retail_price            0.63395   0.01698 37.341 < 2e-16 ***
## bin_wantsSomewhat Popular -0.03505   0.01701 -2.061 0.039390 *  
## bin_wantsVery Popular      0.05897   0.01714  3.440 0.000586 *** 
## bin_wantsExtremely Popular 0.21847   0.01767 12.364 < 2e-16 *** 
## retroTRUE                  0.19876   0.03155  6.300 3.19e-10 *** 
## collabTRUE:bin_wantsSomewhat Popular 0.07812   0.05956  1.312 0.189690  
## collabTRUE:bin_wantsVery Popular      0.07705   0.05829  1.322 0.186251  
## collabTRUE:bin_wantsExtremely Popular 0.50417   0.06165  8.178 3.49e-16 *** 
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4277 on 6154 degrees of freedom
## Multiple R-squared: 0.3517, Adjusted R-squared: 0.3508
## F-statistic: 371 on 9 and 6154 DF, p-value: < 2.2e-16

## Analysis of Variance Table
##
## Model 1: log_resale_price ~ collab + log_retail_price + bin_wants + retro +
##           collab:bin_wants
## Model 2: log_resale_price ~ collab + log_retail_price + bin_wants + brand +
##           retro + release_month + release_dow + wmn + collab:bin_wants +
##           log_retail_price:brand
##   Res.Df   RSS Df Sum of Sq   F   Pr(>F)    
## 1    6154 1125.7
## 2    6114 1075.4 40    50.319 7.152 < 2.2e-16 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## Analysis of Variance Table
##

```

```

## Model 1: log_resale_price ~ collab + log_retail_price + bin_wants + brand +
##      retro + release_month + release_dow + wmnss + collab:bin_wants +
##      log_retail_price:brand
## Model 2: log_resale_price ~ brand + release_month + release_dow + wmnss +
##      collab + retro + kids + main_color + bin_wants + log_retail_price +
##      bin_wants:collab + log_retail_price:brand + collab:main_color
##   Res.Df     RSS Df Sum of Sq    F   Pr(>F)
## 1   6114 1075.4
## 2   6093 1067.8 21    7.6161 2.0695 0.002817 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##                                     2.5 %       97.5 %
## (Intercept)           1.176620e+01 1.966458e+01
## brandAir Jordan        1.324398e-01 3.962844e-01
## brandAsics            1.338366e-01 8.643403e+05
## brandConverse          4.840458e-04 8.763348e-01
## brandJordan Brand     9.967784e-02 1.306241e+00
## brandNew Balance       1.618964e-04 3.250112e+00
## brandNike              1.219457e-01 2.307072e-01
## brandNike Basketball  2.871492e-02 4.923019e-01
## brandNike Running      3.407481e-02 4.139029e+00
## brandOther Brands     1.782210e-01 6.103646e+00
## brandPuma               1.316686e-01 8.558040e+00
## brandReebok             1.592570e-01 4.075225e+00
## release_monthFeb       9.699678e-01 1.086757e+00
## release_monthMar       1.022194e+00 1.145166e+00
## release_monthApr       9.675182e-01 1.085790e+00
## release_monthMay       9.230073e-01 1.041289e+00
## release_monthJun       9.831023e-01 1.104860e+00
## release_monthJul       9.581985e-01 1.079259e+00
## release_monthAug       9.679660e-01 1.088748e+00
## release_monthSep       1.007962e+00 1.137958e+00
## release_monthOct       9.784459e-01 1.107580e+00
## release_monthNov       1.028946e+00 1.157187e+00
## release_monthDec       1.023402e+00 1.152807e+00
## release_dowMonday      1.032461e+00 1.185036e+00
## release_dowTuesday     9.591209e-01 1.090720e+00
## release_dowWednesday   9.667666e-01 1.087685e+00
## release_dowThursday    9.388039e-01 1.042063e+00
## release_dowFriday      9.555792e-01 1.065774e+00
## release_dowSaturday    9.829524e-01 1.093124e+00
## wmnssTRUE                9.948065e-01 1.059472e+00
## collabTRUE               9.618569e-01 1.199861e+00
## retroTRUE                1.103626e+00 1.252890e+00
## kidsTRUE                 9.415511e-01 1.029880e+00
## main_colorBlue           9.731827e-01 1.040380e+00
## main_colorBrown          9.028227e-01 1.048631e+00
## main_colorGray           9.371387e-01 1.046281e+00
## main_colorGreen          9.250752e-01 1.076311e+00
## main_colorMulti-Color   9.998458e-01 1.181497e+00
## main_colorOrange         8.709724e-01 1.012612e+00
## main_colorPurple         9.032237e-01 1.044140e+00
## main_colorRed            9.623995e-01 1.056666e+00

```

```

## main_colorWhite          9.854352e-01 1.045143e+00
## main_colorYellow         7.863189e-01 1.047039e+00
## bin_wantsSomewhat Popular 9.423282e-01 1.009768e+00
## bin_wantsVery Popular    1.013673e+00 1.089080e+00
## bin_wantsExtremely Popular 1.148046e+00 1.241521e+00
## log_retail_price         1.405697e+00 1.558695e+00
## collabTRUE:bin_wantsSomewhat Popular 1.003744e+00 1.266332e+00
## collabTRUE:bin_wantsVery Popular    9.973331e-01 1.254489e+00
## collabTRUE:bin_wantsExtremely Popular 1.498079e+00 1.907147e+00
## brandAir Jordan:log_retail_price   1.240162e+00 1.540905e+00
## brandAsics:log_retail_price       6.360763e-02 1.443149e+00
## brandConverse:log_retail_price   1.018993e+00 5.249431e+00
## brandJordan Brand:log_retail_price 9.294067e-01 1.572913e+00
## brandNew Balance:log_retail_price  7.829926e-01 5.558431e+00
## brandNike:log_retail_price        1.361099e+00 1.551150e+00
## brandNike Basketball:log_retail_price 1.172875e+00 2.035948e+00
## brandNike Running:log_retail_price  7.695449e-01 2.067337e+00
## brandOther Brands:log_retail_price 6.870602e-01 1.418858e+00
## brandPuma:log_retail_price        6.092268e-01 1.445018e+00
## brandReebok:log_retail_price      7.565723e-01 1.461488e+00
## collabTRUE:main_colorBlue        8.259890e-01 1.018569e+00
## collabTRUE:main_colorBrown       8.147132e-01 1.165576e+00
## collabTRUE:main_colorGray        5.608252e-01 9.127867e-01
## collabTRUE:main_colorGreen       8.977489e-01 1.457931e+00
## collabTRUE:main_colorMulti-Color 7.405521e-01 1.134137e+00
## collabTRUE:main_colorOrange      9.810038e-01 1.406204e+00
## collabTRUE:main_colorPurple      8.592863e-01 1.299269e+00
## collabTRUE:main_colorRed         9.115668e-01 1.264243e+00
## collabTRUE:main_colorWhite       1.018054e+00 1.224174e+00
## collabTRUE:main_colorYellow      7.717226e-01 1.418703e+00

```

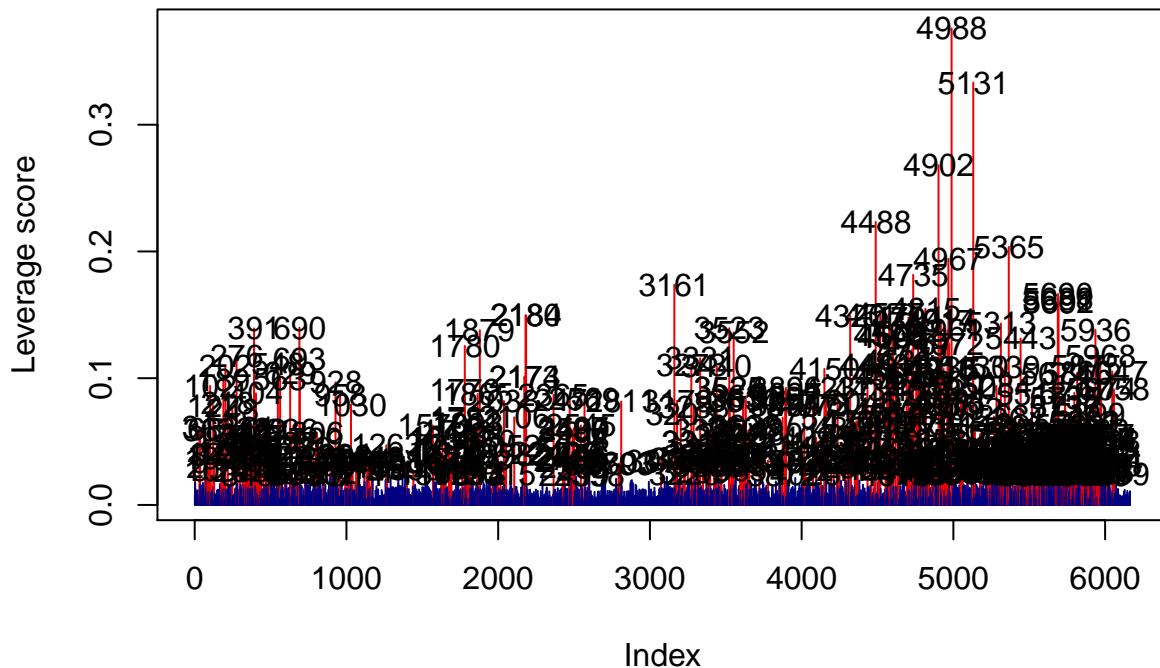
##	brandAir Jordan	brandAsics
##	353.059584	2182.109071
##	brandConverse	brandJordan Brand
##	520.080647	319.790886
##	brandNew Balance	brandNike
##	400.075956	232.428448
##	brandNike Basketball	brandNike Running
##	401.539087	272.226211
##	brandOther Brands	brandPuma
##	451.504644	365.287879
##	brandReebok	release_monthFeb
##	372.539592	2.698560
##	release_monthMar	release_monthApr
##	2.758851	3.063686
##	release_monthMay	release_monthJun
##	2.352315	2.510071
##	release_monthJul	release_monthAug
##	2.383284	2.524564
##	release_monthSep	release_monthOct
##	2.231865	2.108956
##	release_monthNov	release_monthDec
##	2.391471	2.320492
##	release_dowMonday	release_dowTuesday

```

##          1.814133          2.268680
## release_dowWednesday          2.704698          4.628991
##          2.704698          4.155572          5.407437
## release_dowFriday          4.155572          wmnstTRUE
##          4.155572          1.186176          collabTRUE
##          1.186176          retroTRUE          10.522385
##          retroTRUE          1.116743          kidsTRUE
##          1.116743          main_colorBlue          1.227197
##          main_colorBlue          1.441675          main_colorBrown
##          1.441675          main_colorGray          1.304606
##          main_colorGray          1.154905          main_colorGreen
##          1.154905          main_colorMulti-Color          1.172617
##          main_colorMulti-Color          1.256948          main_colorOrange
##          1.256948          main_colorPurple          1.305476
##          main_colorPurple          1.230762          main_colorRed
##          1.230762          main_colorWhite          1.246164
##          main_colorWhite          1.480763          main_colorYellow
##          1.480763          bin_wantsSomewhat Popular          1.329789
##          bin_wantsSomewhat Popular          1.920047          bin_wantsVery Popular
##          1.920047          bin_wantsExtremely Popular          2.200202
##          bin_wantsExtremely Popular          2.665832          log_retail_price
##          2.665832          collabTRUE:bin_wantsSomewhat Popular          3.313898
##          collabTRUE:bin_wantsSomewhat Popular          3.729120          collabTRUE:bin_wantsVery Popular
##          3.729120          collabTRUE:bin_wantsExtremely Popular          4.252918
##          collabTRUE:bin_wantsExtremely Popular          3.187039          brandAir Jordan:log_retail_price
##          3.187039          brandAsics:log_retail_price          357.990262
##          brandAsics:log_retail_price          2182.882839          brandConverse:log_retail_price
##          2182.882839          brandJordan Brand:log_retail_price          520.426173
##          brandJordan Brand:log_retail_price          319.826771          brandNew Balance:log_retail_price
##          319.826771          brandNike:log_retail_price          400.074258
##          brandNike:log_retail_price          238.020203          brandNike Basketball:log_retail_price
##          238.020203          brandNike Running:log_retail_price          402.871264
##          brandNike Running:log_retail_price          272.192130          brandOther Brands:log_retail_price
##          272.192130          brandPuma:log_retail_price          451.642426
##          brandPuma:log_retail_price          364.962463          brandReebok:log_retail_price
##          364.962463          collabTRUE:main_colorBlue          372.424046
##          collabTRUE:main_colorBlue          1.839961          collabTRUE:main_colorBrown
##          1.839961          collabTRUE:main_colorGray          1.421393
##          collabTRUE:main_colorGray          1.142537          collabTRUE:main_colorGreen
##          1.142537          collabTRUE:main_colorMulti-Color          1.219088
##          collabTRUE:main_colorMulti-Color          1.344403          collabTRUE:main_colorOrange
##          1.344403          collabTRUE:main_colorPurple          1.436819
##          collabTRUE:main_colorPurple          1.328049          collabTRUE:main_colorRed
##          1.328049          collabTRUE:main_colorWhite          1.342645
##          collabTRUE:main_colorWhite          2.193171          collabTRUE:main_colorYellow
##          2.193171          1.373942

```

Leverage Scores for all observations



```

## Linear mixed model fit by REML ['lmerMod']
## Formula: log_resale_price ~ (1 | brand) + release_month + release_dow +
##           wmnss + collab + retro + kids + main_color + bin_wants + retail_price
## Data: sneakers
##
## REML criterion at convergence: 7286.3
##
## Scaled residuals:
##    Min      1Q  Median      3Q     Max 
## -5.8785 -0.5723 -0.0271  0.4832  8.7730 
##
## Random effects:
## Groups   Name        Variance Std.Dev.
## brand    (Intercept) 0.008084 0.08991
## Residual           0.184705 0.42977
## Number of obs: 6164, groups: brand, 12
##
## Fixed effects:
##                                         Estimate Std. Error t value
## (Intercept)                         4.0736543  0.0476133 85.557
## release_monthFeb                     0.0213021  0.0297161  0.717
## release_monthMar                     0.0547314  0.0296867  1.844
## release_monthApr                     0.0192001  0.0301579  0.637
## release_monthMay                     -0.0329924 0.0314958 -1.048
## release_monthJun                     0.0284872  0.0304721  0.935
## release_monthJul                     -0.0028104 0.0310392 -0.091
## release_monthAug                     0.0217993  0.0307140  0.710
## release_monthSep                     0.0668168  0.0317158  2.107
## release_monthOct                     0.0417167  0.0324003  1.288

```

## release_monthNov	0.0916576	0.0306865	2.987
## release_monthDec	0.0709083	0.0310721	2.282
## release_dowMonday	0.1779192	0.0357938	4.971
## release_dowTuesday	0.0684542	0.0332779	2.057
## release_dowWednesday	0.0629387	0.0306676	2.052
## release_dowThursday	0.0472275	0.0269842	1.750
## release_dowFriday	0.0448672	0.0282779	1.587
## release_dowSaturday	0.0791715	0.0276000	2.869
## wmnstrue	0.0336349	0.0164518	2.044
## collabtrue	0.2580805	0.0193282	13.353
## retrotrue	0.1511631	0.0329742	4.584
## kidstrue	-0.0610148	0.0228466	-2.671
## main_colorBlue	0.0022677	0.0165131	0.137
## main_colorBrown	-0.0620913	0.0355652	-1.746
## main_colorGray	-0.0089108	0.0280363	-0.318
## main_colorGreen	0.0147141	0.0376136	0.391
## main_colorMulti-Color	0.0616943	0.0401102	1.538
## main_colorOrange	-0.0289575	0.0356443	-0.812
## main_colorPurple	-0.0233059	0.0353917	-0.659
## main_colorRed	0.0205475	0.0234084	0.878
## main_colorWhite	0.0272792	0.0145749	1.872
## main_colorYellow	-0.1027996	0.0658986	-1.560
## bin_wantsSomewhat Popular	0.0117084	0.0170289	0.688
## bin_wantsVery Popular	0.1137923	0.0175774	6.474
## bin_wantsExtremely Popular	0.3047638	0.0191639	15.903
## retail_price	0.0033335	0.0001014	32.859
