Sneakerhead’s Private Equity

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I. Abstract

The purpose of this paper is to try and answer one of the greatest phenomena in the 21st century: why do "sneakerheads" exist? (My condolences, for the individual that is about to spend 20 minutes reading about sneakers. I am not a sneakerhead either, so we can suffer together…). This paper will examine the resale market for rare sneakers, and the characteristics that create value for rarity sneakers on the secondary market. For simplicity sake and proof of concept, I evaluated one shoe that has many different variations in color. Furthermore, I have created a model that predicts the prices of Yeezy Boost 350 V2 by utilizing the following independent variables: colors, shoe sizes, the amount of days between the purchase date and initial release date, and day of the week the transaction occurred. The results from the model propose that much of the value of rare sneakers are not being captured in the primary market. Adidas and Nike's inefficiencies in the primary markets have led to the creation of a secondary market. This model evaluates the characteristics that changes the value of one particular sneaker, Yeezy Boost V2. Ultimately, this model supports the creation of the secondary markets for the sneaker industry and suggests that sneakerheads have an incentive to continue reselling sneakers for a robust profit margin due to the lack of efficiency in the primary market.

II. Introduction

The sneaker resale industry, promulgated by many celebrities and influencers, truly emerged in the past decade around the world. There has been a dynamic shift in culture by viewing sneakers as causal wear as opposed to only utilizing sneakers for exercising. Primary markets have companies that are purposely reducing the quantity of supply in order to manipulate and manufacture high demand. Adidas does limited releases for rare sneakers, where consumers must be randomly picked in order to purchase their sneaker. Obviously, this seems contradictory to economic theory, because firms should produce quantities that meet demand due to their competitive advantage. Consequently, a secondary market emerged from the massive demand created by the primary markets.

The secondary markets are able to capture two to three times the value of the retail prices of these sneakers. According to Dennis Green (2019), a renowned columnist for Business Insider, states that "[s]neaker reselling is projected to become a $6 billion business globally by 2025, according to a recent analysis from Cown & Co. The growth is mainly in Europe, North America, and China, where sneaker culture has flourished and demand for rare sneakers has driven prices up exponentially." Through this comment, Green appears to be highlighting the massive inefficiencies that companies in the primary markets have due to not capturing the full value of their own products. The problem has been exacerbated through the creation of platforms such as StockX and Goat. These companies offer a place for buyers and sellers of rare sneakers to be able come into contact. Also, these companies verify the authenticity of the rare sneakers being sold on their platform, since copies or fakes of rare sneakers are extremely robust.

In the article "Sole value – the sneaker resale market: an explorative analysis of the sneaker resale market," authors Lux and Bug (2018) propose that the majority of resold sneakers, on

platforms such as StockX, have a profit margin of greater than 50% on average. This signifies the inefficiencies and profit losses of the primary markets for rare sneakers. Also, the inability for these companies to capture 1/3 of the true value of these sneakers; has driven the secondary market to emerge. Thus, "sneakerheads" are a byproduct of inefficiencies created by companies such as Nike and Adidas. These companies might have feared competition and lack of demand for only supplying athletic sneakers. Therefore, firms modified their selling methods by manufacturing "hype" around particular releases and through purposely offering limited quantities. This is seen in the article "Sneakerheads' Assessment of Sneaker Value and Behaviors throughout the Sneaker Ownership Cycle" Jin Woo Choi (2017), a Doctoral student at Oregon State University, illustrates that "supply does need to be somewhat restricted to create hype and perceived monetary value. However, when supply is too restricted, there may be negative consequences for the brands and retailers." This manipulation of demand, through lowering supply levels, intrigues consumers through such selling methods, because these sneakers are assumed to become rare shoes in the future. Unfortunately, this may come at a price for the primary market.

This notion was further studied by a student, Nicholas Cassidy, at Appalachian State University. Cassidy (2018) found that "there was no significant difference in consumer preference between demand – scarce products and products with no form of scarcity whatsoever. With a pick rate of 60% for supply – scarce compared to 22% for the demand scare option." According to Cassidy, it appears that these efforts made by companies to manufacture higher demand by offering lower supply is relatively inefficient as well. This means that consumers of rare sneakers are indifferent towards the scarcity of the products. Thus, the secondary market has exploited these inefficiencies of the primary market.

III. Description of Model

I devised a model that regresses shoe sizes, the number of days from the purchase date and the initial release date of the different variation of shoe, the day of the week the shoe was purchased, and the varying colors on each of the three different versions of the same shoe. The dummy variables are the day of the week the shoe was purchased as well as the colors on each variation of shoe. If the sneaker consists of particular color, then the value shall be one in order to indicator a color in a quantitative sense, otherwise the value will be held as zero. This method will also be the same for the independent variable "day of the week the shoe was purchased."

Model 1: *(LogPrices)*

$$LogSale.Price = \beta_1 + \beta_2 Size + \beta_5 S.Grey + \beta_6 Blue(Base) + \beta_7 Black + \beta_8 Date.R + \beta_9 Monday + \beta_{10} Tuesday + \beta_{11} Wednesday + \beta_{12} Thursday + \beta_{13} Friday + \beta_{14} Saturday + \beta_{15} Sunday(Base)$$

Model 2: *(Unit Prices)*

$$Sale.Price = \beta_1 + \beta_2 Size + \beta_5 S.Grey + \beta_6 Blue(Base) + \beta_7 Black + \beta_8 Date.R + \beta_9 Monday + \beta_{10} Tuesday + \beta_{11} Wednesday + \beta_{12} Thursday + \beta_{13} Friday + \beta_{14} Saturday + \beta_{15} Sunday(Base)$$

The chart listed below will describe each of the variables.

Figure 1 – *Defining Variables*

Log Sale. Price	Price of the shoe in percentage terms
Size	Size of the shoe

L. Grey	Light Grey – Dummy Variable for color
Dark. Grey	Dark Grey - Dummy Variable for color
S. Grey	Sesame Grey - Dummy Variable for color
Blue (Base)	Blue - Dummy Variable for color
Black	Black - Dummy Variable for color
Date. R	# of days between the purchase date and the initial date the shoe was released
Monday	Day of purchase – Dummy variable
Tuesday	Day of purchase – Dummy variable
Wednesday	Day of purchase – Dummy variable
Thursday	Day of purchase – Dummy variable
Friday	Day of purchase – Dummy variable
Saturday	Day of purchase – Dummy variable
Sunday (Base)	Day of purchase – Dummy variable

There are three main variations of the same shoe that differ only through the color combination; however, the prices drastically vary between all three shoes. Therefore, the model will help comprehend the external and internal factors that aid to such differentials in willingness to pay. The purpose of taking log of prices is because I want to quantify the percentage change in prices of Yeezy Boost 350 V2 sneakers, when the explanatory variables also change. The price unit of measurement being a percentage change is simply easier to conceptualize for some than the change in dollars. Nevertheless, I still included the unit of measurement in dollars as well, in Model 2, in order to emphasize the drastic price changes for these athletic shoes in layman terms.

The size of the shoe can also help determine some of the value. Presumably, economics theory of supply and demand shall remain true in evaluating shoe sizes. The demand for rare sneakers beyond the average shoe size should be quite low, whereas demand for the average shoe sizes should be extremely high. In essences, I hypothesis that shoe size will most likely decrease the value of rare sneakers. Although the average shoe sizes will have the most demand, there are many different options for sizes outside of this range. The sizes beyond the average shoe sizes should have little demand and decreased prices that outweigh the demand for the average shoe size.

Furthermore, the ability to measure the factors that contribute significantly to understanding the valuation of rarity sneakers, will need to have many qualitative variables within the model such as color. The beauty of this study is that the shoe under observation is perfectly identical but varies in colors and price. This enables the ability to quantify the value – added when particular colors are present in one variation of this shoe compared to other variations, where that same color (or similar color) is absent.

A fascinating aspect about the secondary market for rare sneakers is that many sneakers actually double or triple in value immediately on release dates. Therefore, I am observing whether time plays a vital role in sneakers gaining value or not, through calculating the difference in number of days between the purchase date and the initial release date of the sneaker. Many individuals speculate that holding onto any item for extensive periods of time can create value, and I can apply this notion to rare sneakers. This would appear to be true in the resale market for rare sneakers, because there is an extremely limited supply produced. Also, the supply decreases overtime due to individuals deteriorating sneakers through natural wear and tear, rather than simply preserving the shoes. My preconceived notion on the matter is that as

supply decreases overtime, then demand shall increase which create more value for these sneakers over extensive periods of time.

Finally, the days of the week that a sneaker was purchased could also explain the differences in willingness to pay. The premise behind observing the day of purchase is further discover the purchasing behavior of those in this sample population. Many individuals are either paid weekly or biweekly, therefore, I propose that more individuals would make purchases towards the end of the week opposed to the beginning of the week. If individuals are purchasing rare sneakers on the day that they also receive wages, then this could drive prices to increase near the end of the week.

IV. Description of the Data Used

All of the data that was collected for this research was from the platform StockX. This company records and publishes the purchase history for each shoe on their website. Sellers post their products to this platform, and buyers can either buy at seller's original price or place a bid. The seller has to option to choose the highest bid for their shoe or forgo all bids, until bids eventually equate to the seller's original listed price. The data collected from StockX was all three different variations of the Yeezy Beluga V2 sneaker. The only differences in the three variations of this sneaker was the color, while all other features such as material and shape were constant. The data collected was the purchase history of each of the three variations of this shoe over the past 3 months. This had a robust sample size of 4,117 observations in total for the combined three variations of this sneaker. Also, this is panel data due to the different entities being tracked over different periods of time.

V. Interpretation of the Variable and Estimated Model

The interpretations for Figure 2 will be in terms pertaining to the percentage change of prices in the presence of the changes in the explanatory variables ($\Delta y \approx (100\beta_1)\Delta x$). While, Figure 3, will be conveyed in unit – unit ($\Delta y \approx \beta_1 \Delta x$) in order to emphasize value – added by particular explanatory variables such as color. These are the results for both models:

Figure 2 – *Regression Results for Model 1(LogPrice)*

```
lm_robust(formula = Sale.Price ~ Size + S.Grey + Black + Date.R +
    Monday + Tuesday + Wednesday + Thursday + Friday + Saturday,
    data = df)

Standard error type:  HC2

Coefficients:
             Estimate Std. Error t value  Pr(>|t|)   CI Lower   CI Upper   DF
(Intercept)  5.766e-01  7.244e-03 79.5953 0.000e+00  5.624e-01  5.908e-01 3909
Size        -1.070e-03  1.378e-04 -7.7660 1.027e-14 -1.340e-03 -8.000e-04 3909
S.Grey      -2.526e-02  3.801e-03 -6.6446 3.459e-11 -3.271e-02 -1.781e-02 3909
Black        4.893e-02  3.378e-03 14.4849 2.350e-46  4.231e-02  5.555e-02 3909
Date.R       3.359e-05  1.091e-05  3.0793 2.089e-03  1.221e-05  5.498e-05 3909
Monday      -4.582e-04  7.693e-04 -0.5956 5.515e-01 -1.967e-03  1.050e-03 3909
Tuesday     -3.112e-03  7.296e-04 -4.2658 2.039e-05 -4.542e-03 -1.682e-03 3909
Wednesday   -1.758e-03  7.990e-04 -2.2004 2.783e-02 -3.325e-03 -1.917e-04 3909
Thursday    -1.504e-03  7.609e-04 -1.9764 4.818e-02 -2.996e-03 -1.203e-05 3909
Friday      -9.280e-04  7.397e-04 -1.2545 2.097e-01 -2.378e-03  5.223e-04 3909
Saturday    -7.168e-04  7.679e-04 -0.9334 3.507e-01 -2.222e-03  7.887e-04 3909

Multiple R-squared:  0.8392 ,   Adjusted R-squared:  0.8388
F-statistic:  2983 on 10 and 3909 DF,  p-value: < 2.2e-16
```

Figure 3 – *Regression Results for Model 2 (Unit Price)*

```
lm_robust(formula = Sale.Price ~ Size + S.Grey + Black + Date.R +
    Monday + Tuesday + Wednesday + Thursday + Friday + Saturday,
    data = df)

Standard error type:  HC2

Coefficients:
            Estimate Std. Error t value   Pr(>|t|)   CI Lower CI Upper   DF
(Intercept) 409.4834   30.58079 13.3902  5.187e-40  349.52762 469.4392 3909
Size         -5.3251    0.61366 -8.6776  5.836e-18   -6.52826  -4.1220 3909
S.Grey      -96.3661   16.09225 -5.9884  2.311e-09 -127.91607 -64.8161 3909
Black       397.1342   14.75796 26.9098 1.767e-146  368.20017 426.0682 3909
Date.R        0.1057    0.04587  2.3053  2.120e-02    0.01582   0.1957 3909
Monday       -2.0720    3.35808 -0.6170  5.373e-01   -8.65572   4.5118 3909
Tuesday     -10.6908    3.18375 -3.3579  7.928e-04  -16.93273  -4.4488 3909
Wednesday    -5.5369    3.66673 -1.5100  1.311e-01  -12.72583   1.6519 3909
Thursday     -6.0874    3.42144 -1.7792  7.529e-02  -12.79536   0.6206 3909
Friday       -2.9916    3.25345 -0.9195  3.579e-01   -9.37019   3.3871 3909
Saturday     -4.6350    3.24459 -1.4285  1.532e-01  -10.99626   1.7263 3909

Multiple R-squared:  0.8984 ,   Adjusted R-squared:  0.8982
F-statistic:  1288 on 10 and 3909 DF,  p-value: < 2.2e-16
```

Figure 4 – *Regression Results for Model 2 With Fixed Effects (Unit Price)*

```
Oneway (individual) effect Within Model

Call:
plm(formula = Sale.Price ~ Size + S.Grey + Black + Date.R + Monday +
    Tuesday + Wednesday + Thursday + Friday + Saturday, data = df,
    model = "within", index = c("Type", "DateTime"))

Unbalanced Panel: n = 3, T = 291-2870, N = 3920

Residuals:
    Min.  1st Qu.   Median  3rd Qu.     Max.
-159.054  -30.547  -13.272   23.676  526.816

Coefficients:
            Estimate Std. Error  t-value  Pr(>|t|)
Size       -5.325129   0.418065 -12.7376 < 2.2e-16 ***
Date.R      0.105749   0.045636   2.3172 0.0205429 *
Monday     -2.071969   3.174898  -0.6526 0.5140464
Tuesday   -10.690763   2.989320  -3.5763 0.0003527 ***
Wednesday  -5.536939   3.260033  -1.6984 0.0895062 .
Thursday   -6.087386   3.129172  -1.9454 0.0518025 .
Friday     -2.991565   3.133965  -0.9546 0.3398581
Saturday   -4.635002   3.247851  -1.4271 0.1536315
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares:    10340000
Residual Sum of Squares: 9868500
R-Squared:      0.045557
Adj. R-Squared: 0.043116
F-statistic: 23.3229 on 8 and 3909 DF, p-value: < 2.22e-16
```

To address the differences in R^2, this is due to the manipulation of units in the log(price) model which makes the R^2 considerably different from the unit price model. I will interpret Figure 3 in order intuitively explain the impacts of each explanatory variable in terms that mostly relate to the layman. Also, the numbers are extremely small and easily able to conceptualize, since it is only in hundreds of dollars. Moreover, the intercept is pertinent to the base value of the Yeezy Boost V2 on the secondary market, before adding or subtracting any of the affects from the other independent variables on the price. The retail price for this sneaker is $220, and the resale for this sneaker, before considering any of the characteristics, is $409. This is already a total return of 86% ((409-220/220) *100) for the reseller (make sense why sneakerhead exist, right?). For every additional increase in shoe size will decrease the price by $5.32. If a variation of this shoe has the color Black present, then this will increase the value of the sneaker by $397. While the color Sesame Grey being present on one of the variations of this shoe will decrease the price of the sneaker by $96.

For every additional increase in number of days between the release date and purchase date, will increase the value of the shoe by $0.10. It is important to keep in mind that even though the monetary value seems insignificant, do consider that the release date for many of these shoes are around 600 to 900 days away from the purchase date. For every additional purchase on Monday, will decrease the value of the sneaker by $2.07. For purchases made on Tuesday, will also decrease the price for these sneakers by $10.69. Purchases made on Wednesday, decreases prices by $5.53. Thursday purchases will decrease the value by $6.08. Transactions made on Friday will decrease prices by $2.99, and purchase taking place on Saturday will decrease the value of the sneaker by $4.63. All explanatory variables listed in Figure 3 are statistically significant at the 5% level, except Monday, Wednesday, Thursday, Friday, and Saturday.

However, panel data typically needs fixed effects in order to control for omitted variable bias. This is seen in Figure 4. The majority of the independent variables' beta estimates remained the same, however, the most significant take away from the fixed effects is the R^2 deducing to 4% from 89%. All models were conducted with control for robust standard errors, but clustered robust standard errors were unable to be ran in R for unknown reasons. This would mean that some of the variables that are on the broadline of being statistically significant, such as Wednesday or Thursday in Figure 4, could actually not be statistically significant and have larger standard errors.

VI. Economic Analysis and Evaluations

This is also already stated above, but the value of the Yeezy Boost V2, without considering the effects of the other independent variables, has a base value of $409. For the most part, individuals can make a profit from reselling these sneakers. For example, if an individual buys the sneaker on the worst day, Tuesday – $10.69, foot size of 11, Date released was a day ago, and the color Sesame Grey is present (assuming it was significant); the reseller still has the incentive to sell the rare shoe for a profit of $243.89 (((($409)+ (1*-10.69)+(11*-5.32)+(1*.10)+(1*-96) = $243.89). This is a total return (percentage change) of 10.86% (($243.86-$220)/$220), which is still higher than the historical return of the stock market (7%). Therefore, looking at the worst-case scenario, a reseller of this sneaker is still able to produce a return that is quite robust compared to the historical returns of the stock market. Buyers of the Yeezy Boost V2 should always have the incentive to resell the shoe and be able to quantify the value of the sneaker with the help of the presence of certain characteristics. Therefore, if newer variations of this shoe are produced with these favorable characteristics, individuals should invest in these sneakers for the purpose of reselling at a healthy return.

VII. Summary

Many companies have adopted this method of selling "collaborative" or retro sneakers at extremely limited quantities in order to drive demand and interest of the consumers. Unfortunately, these inefficiencies for primary market firms to be able to capture the total value of the sneakers produced, the birth of "sneakerheads" began reaping the rewards in the secondary market for rare sneakers. This research supports the economic dynamics of the secondary market and how sneakers gain immediate value in the secondary market.

VIII. Suggestion for Studies in the Future

In the article "The Stories that Come With the Shoe': A Qualitative Study of Male Sneaker Collector Motivations, Experiences, and Identities." Arienne McCracken et al. (2016) emphasized that individuals collected shoes for many reasons, "shoes that were associated with particular moments in history were prized… second reason for collecting was purely aesthetic. Boyd liked to have the same shoe model in several different colorways so he could color coordinate with his clothing." This comment illustrates that sneakers have many more characteristics to them than meets the eye such as historical sentiment. Thus, it would be interesting to further study the effects that historical sporting events have on sneaker value.

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