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BACKGROUND

Gilt is a purveyor of discounted designer goods. Unlike its other online competitors, consumers are allowed 36 hours to view the sales and make their purchases before the merchandise changes. A membership is required to get these special offers. Gilt makes it easy and fun for members to browse the latest fashion and lifestyle trends. Their inventory ranges from apparel to travel deals which makes it such an all-inclusive shopping website.

Introduction

Demand is a very important economic principle that describes a consumer's desire and willingness to pay a price for a specific good or service. In general, with all other factors held constant, an increase in the price of a good or service will decrease demand. Graphically this will be a negative relationship between price and quantity. Understanding the concept of demand is very important, however, there is more information that can be found by understanding the concept of Price Elasticity of Demand.

Price Elasticity of Demand is a measure of the relationship between a change in the quantity demanded and a change in its price. By using simple formulas, you can discover price sensitivity, or in other words the elasticity of a good. To measure elasticity, you divide the % change in quantity by the % change in price. If the value is greater than 1, it normally suggests that the demand for the good is affected by the price and if the value is less than one, it suggests that the demand is not sensitive to price. This is useful for businesses because if the demand is not sensitive to price, businesses will raise their prices.

METHODOLOGY

We estimate a demand function for GILT's products using the multiple linear regression analysis, and measure the GILT consumers' price elasticity of demand for each product categories, sales start day of week and month, country of origin, and season ID. In Economics, price elasticity is one of the most basic measures that provide information about consumer behavior with respect to price changing, but it is hard to obtain in practice because of lack of suitable market sales data. Fortunately, the GILT data has most of desired variables that allow us to estimate the demand function and measure the elasticity.

Here we consider a multiple linear regression model as

$$y_i = \beta_0 + \beta_1 \cdot \log unit\_price + \mathbf{x_i}\gamma + u_i$$

where,

y_i: Sale-through ratio of look i

$unit\_price$: Selling price of the look, natural log scale

$\mathbf{x_i}$: A vector of interaction terms of the log unit price with all indicator variables

β_1: Price elasticity of demand parameter ($= \Delta y \Delta unit\_price \times 100$ %)

γ: A vector of the price elasticity parameters that corresponds to each categories of product, start date, etc.

By performing the ordinary least squares (OLS) estimation, we can estimate the elasticity parameters β_1 and γ, and identify in what category, day of week, month, season, or country of origin have bigger price elasticity the the other. We can provide the most effective sales promotion strategy by analyzing the estimated price elasticity.

Interpretation Rule

: Let γ_k be a price elasticity estimate for Monday as a sales start date.

$\gamma_k < -0.01$ and statistically significant

: Demand for GILT product on Monday is elastic, and $(-\gamma_k \times 100)$% of sale-through ration will be increased if 1 dollar discount is given on Monday.

$-0.01 < \gamma_k < 0$ and statistically significant

: Demand for GILT product on Monday is inelastic, and $(-\gamma_k \times 100)$% of sale-through ration will be increased if 1 dollar discount is given on Monday.

$\gamma_k > 0$ or statistically insignificant
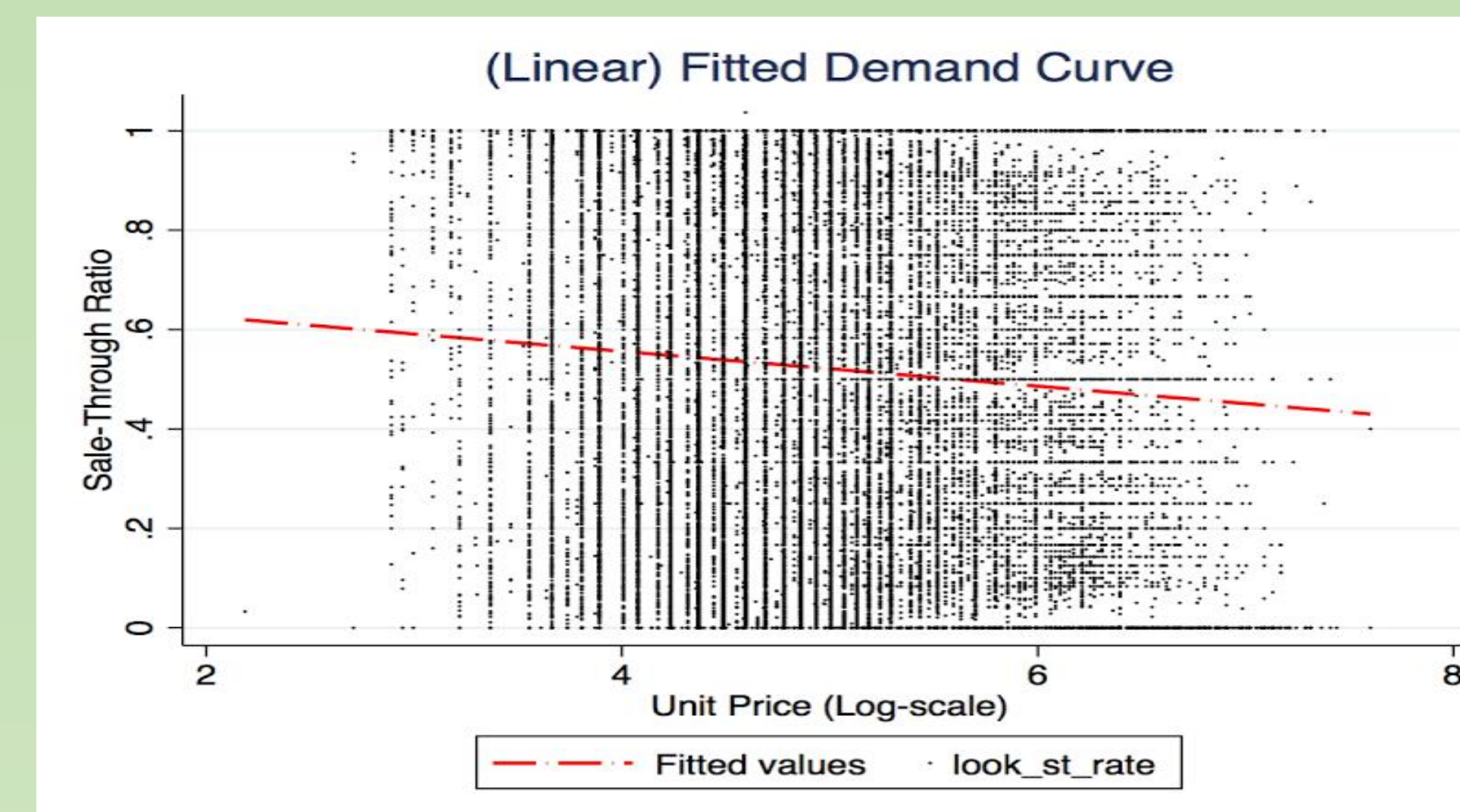
RESULTS

(Linear) Fitted Demand Curve

Figure1. elasticity estimates for weekday

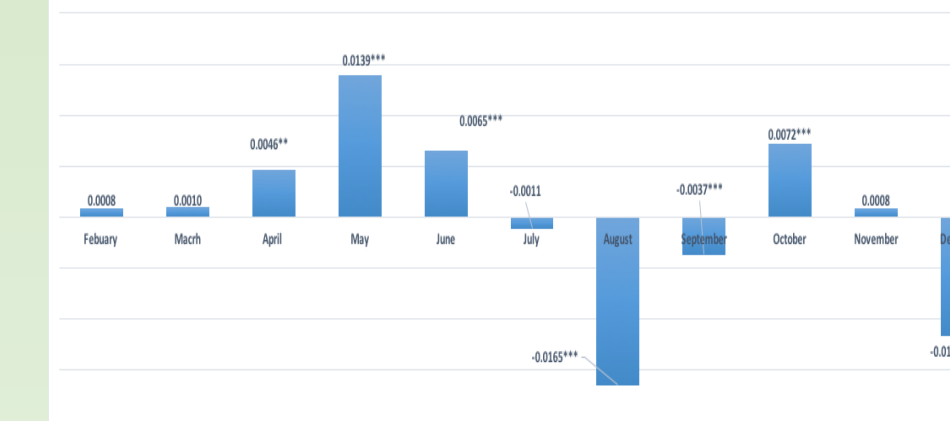Figure 2. elasticity estimates for month
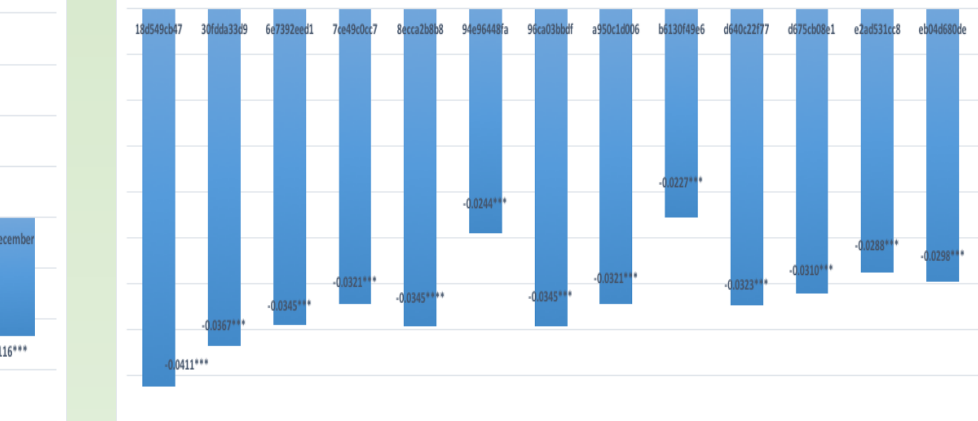

Figure 3. elasticity estimates for color

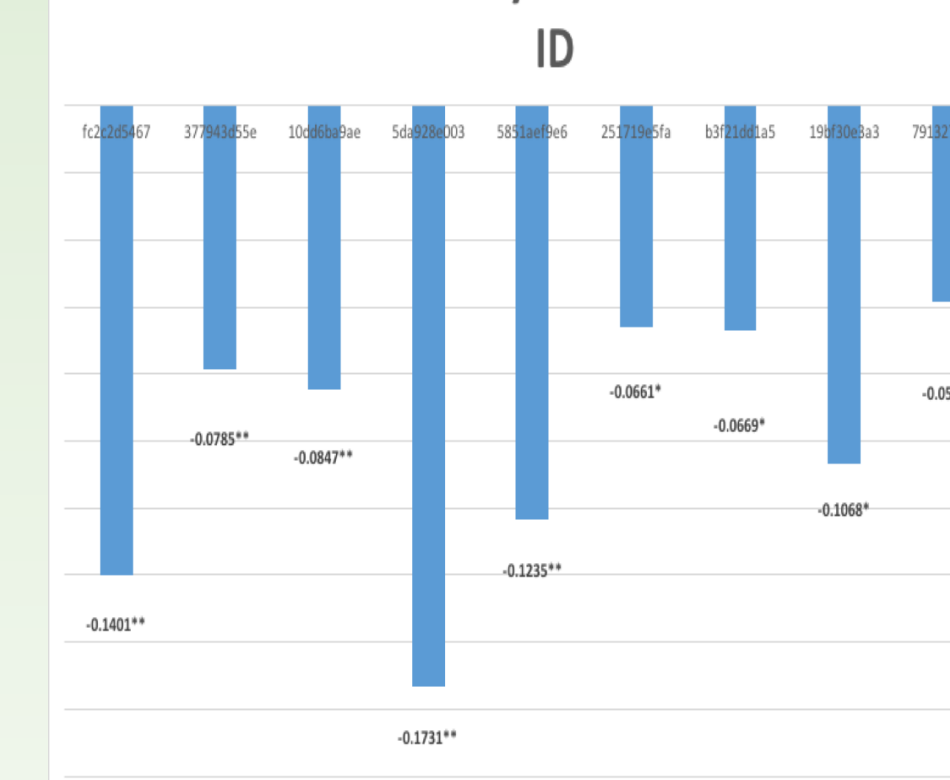FIGURE 4. elasticity estimates For Product ID
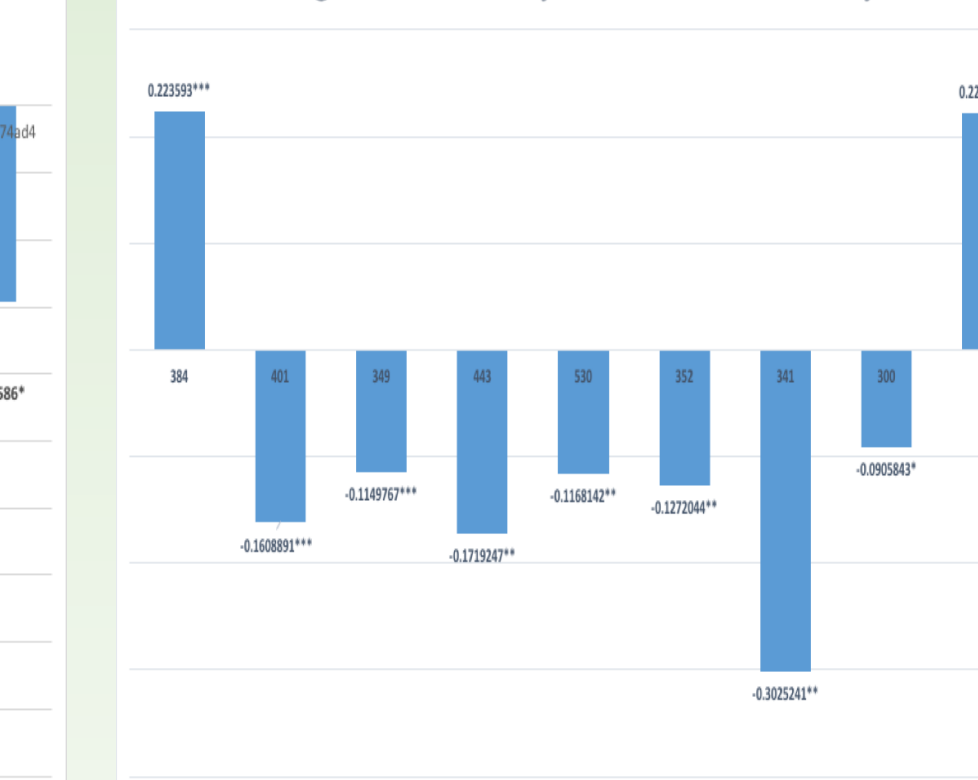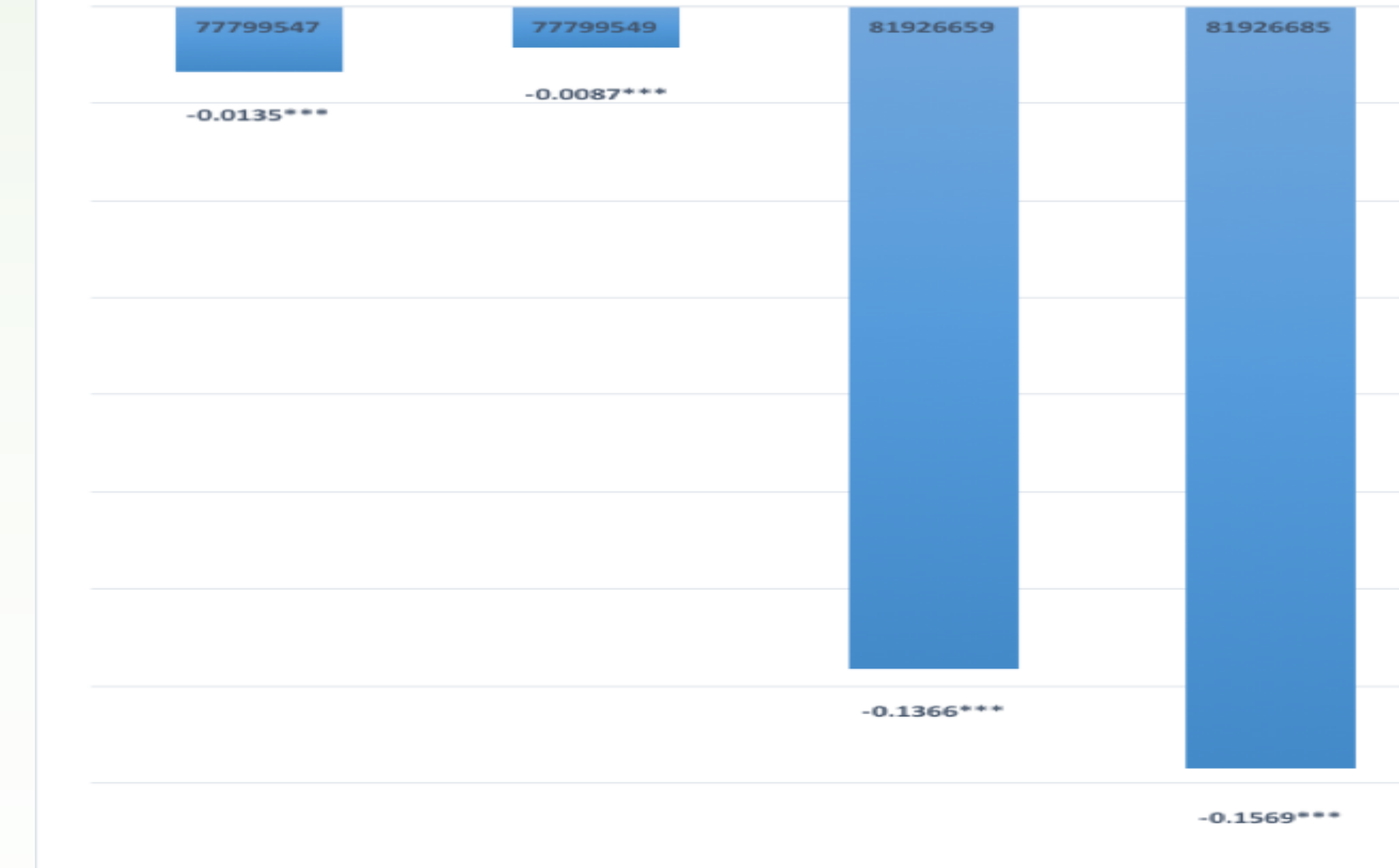

Figure 5. elasticity estimates for country

Figure 6. elasticity estimates for seasons

CONCLUSION

The scatterplot of Sale-Through ratio VS (log) unit price shows that visual representation of our analysis. The data points seem to be scattered randomly but the linear regression fitted line, the red log-dashed line, has negative slope, which satisfies the law of demand. Note that the overall fit F-statistic is 35.38, and the adjusted R-squared is 0.1165 for our demand model estimate.

In figure 1, Saturday has the most elastic demand. It has -0.0102 with statistical significance under 10% significance level. In figure 2, August, September, and December have statistical significant elasticity estimates under 1% significance level. In figure 3, all color codes have statistical significant elasticity estimates under 1% significance level. In figure 4, all product ID's elasticity estimates are statistical significant, and negative. In figure 5, the reported country origin ID's have statistically significant elasticity estimates, and negative except "384" and "331". Note that we present only statistically significant elasticity estimates for figure 4 and figure 5. In figure 6, all four seasons have statistically significant elasticity estimates under 1% significance level, but the seasons with ID "8916659" and "81926685".

In conclusion based on our demand model estimation, the optimal pricing discount strategy is to begin implementing significant price discounts on a Saturday, in the month of August, on items with the color code "18d549cb47", on products with the code "5da928e003" on items from the county coded "341", during season coded "81926685".

By doing this we believe the sales and thus profits will increase due to the fact that these aspects discussed have the most significant elastic demand.

*Note that we assume that August and season "81926685" having the highest elastic demand overlap each other.

ACKNOWLEDGEMENT