The Luxury of Increased Sales for Gilt.com
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For the purpose of this analysis, the variable entitled "sale_look_st_rate" was transformed to account for not only how much of a look sold, but how quickly it sold. Our new variable, referred to as "Sell-Through Rate per day" was calculated by dividing the "sale_look_st_rate" by the exact amount of days the look was sold. Also, after exploratory analysis was conducted on the data, two groups of responses were removed because they were deemed potentially damaging to the overall quality of the models. These two removed groups were those data that were missing either Unit Price or MSRP (71 records), and those that had selling prices above the MSRP (5 records). In total, these two removed groups only composed 0.0019% of the total data set.

Optimization of Looks Available
Increasing Sell-Through via Monthly Recommendations

We have determined that there is a negative correlation between the amount of looks GIlt.com sells each month and the average sell-through rate per day. The below three-step analysis will result in suggested revisions of Gilt.com's "supply" -- or looks sold -- for each month to optimize higher sell-through rates.

Sell-Through per Day (Average) by Monthly Amount of Looks Sold
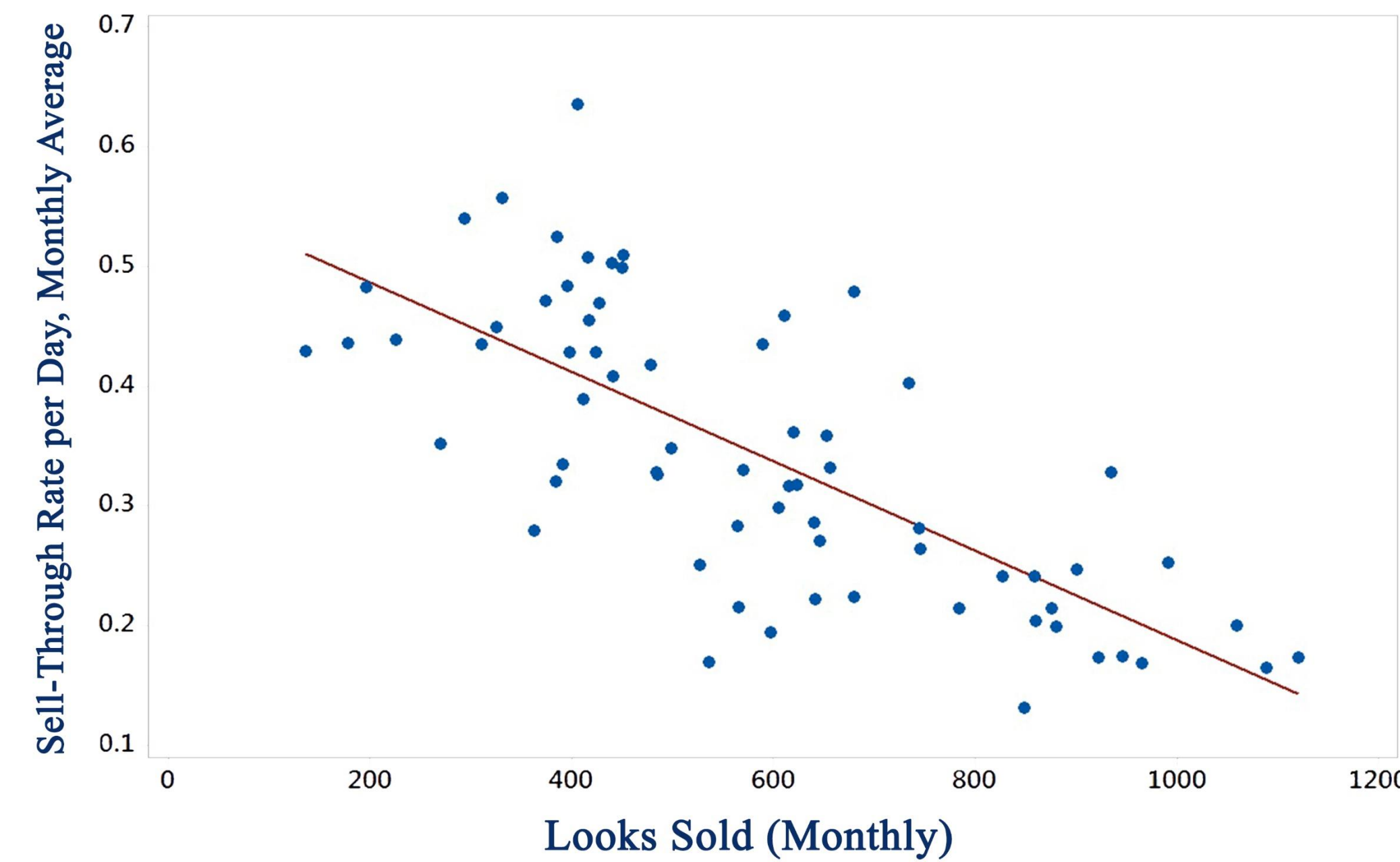
As shown on the left, as the amount of looks sold in a month increases, the average sell-through rate per day decreases. The equation for this regression is:

[Average Sell-Through Rate per Day] = 0.5618 - (0.000363 * [Amount of Looks Sold in Month])

Adjusted R Squared is 53.47%

Note: Only data from 2010 to 2015 was included, because in prior years, Gilt.com's sales exhibited behavior inconsistent with later patterns.

On the right are seasonal indices based on past data that explain how sales vary from month to month. To arrive at this figure, we summed the original "Look Sell-Through Rate" (not the derived ratio we used for later analyses) for each individual month. Because data for 2015 was incomplete, we divided each sum by the number observations for each individual month to eliminate any bias. Next, we found the average of all 12 aggregated amounts to establish a baseline level of sales activity. Finally, percentage differences from the baseline were calculated. These percentage figures serve as the seasonal indices to the right.

These seasonal indices are vital due to the unique nature of the fashion industry -- monthly variations are frequent due to the holidays as well as releases of new apparel for each season. Ideally, our seasonal index calculation would have been more accurate had we known the actual amount of items sold within each month -- not just the number of overall looks sold within the month. However, this approximation is necessary to aid in the following recommendations.

Month	Seasonal Index
January	-3.8%
February	7.3%
March	3.2%
April	-31.0%
May	15.6%
June	44.2%
July	8.1%
August	-8.3%
September	-12.7%
October	-25.6%
November	-6.3%
December	9.3%

Recommended Look to Sell, Monthly
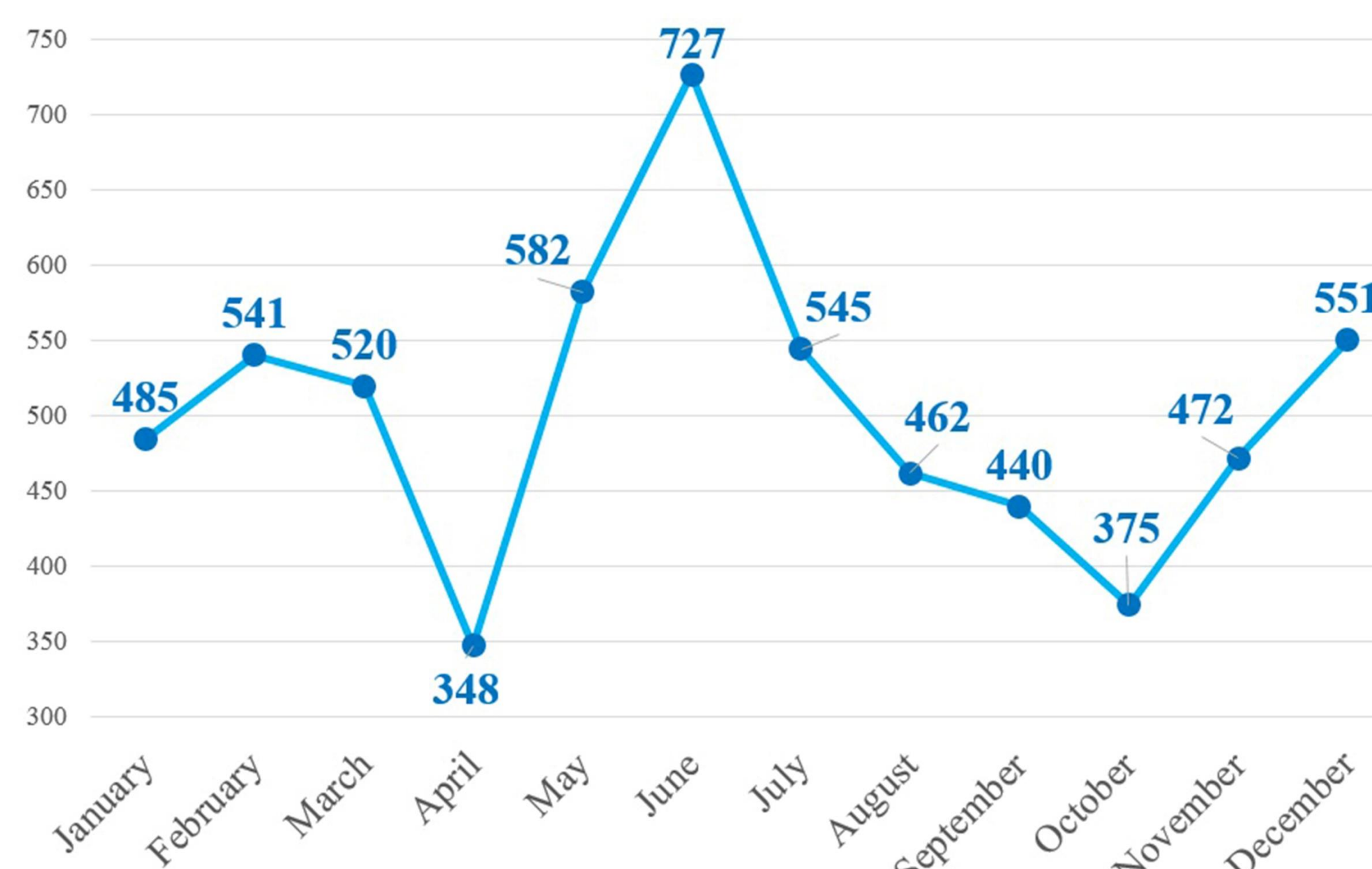
On the left is our recommendation for the amount of looks Gilt.com should sell to attain a sell-through rate per day of 40%.

40% was chosen due to the fact that this was the when the rate was at its strongest from 2010 to 2011. Any desired sell-through rate per day could be attained using the same formulas. The process to attain a different sell-through rate is:

1) Solve top regression equation for "Amount of Looks Sold in Month"

2) Multiply this figure by the corresponding monthly seasonal index.

Sell-Through Rate
The most vital metric for Gilt.com

As shown below, the Sell-Through Rate per Day has been dropping steadily since early 2013. This is problematic because the looks that Gilt.com puts on the market are taking longer to sell. This is largely a function of Gilt.com's increasing supply of looks sold over the same time period. This relationship is detailed in "Optimization of Looks Available" to the left. Below, we will discuss the importance of the Sell-Through per day metric and highlight the benefits for Gilt.com if this decline could be reversed.

Declining Sell-Through Rate per Day
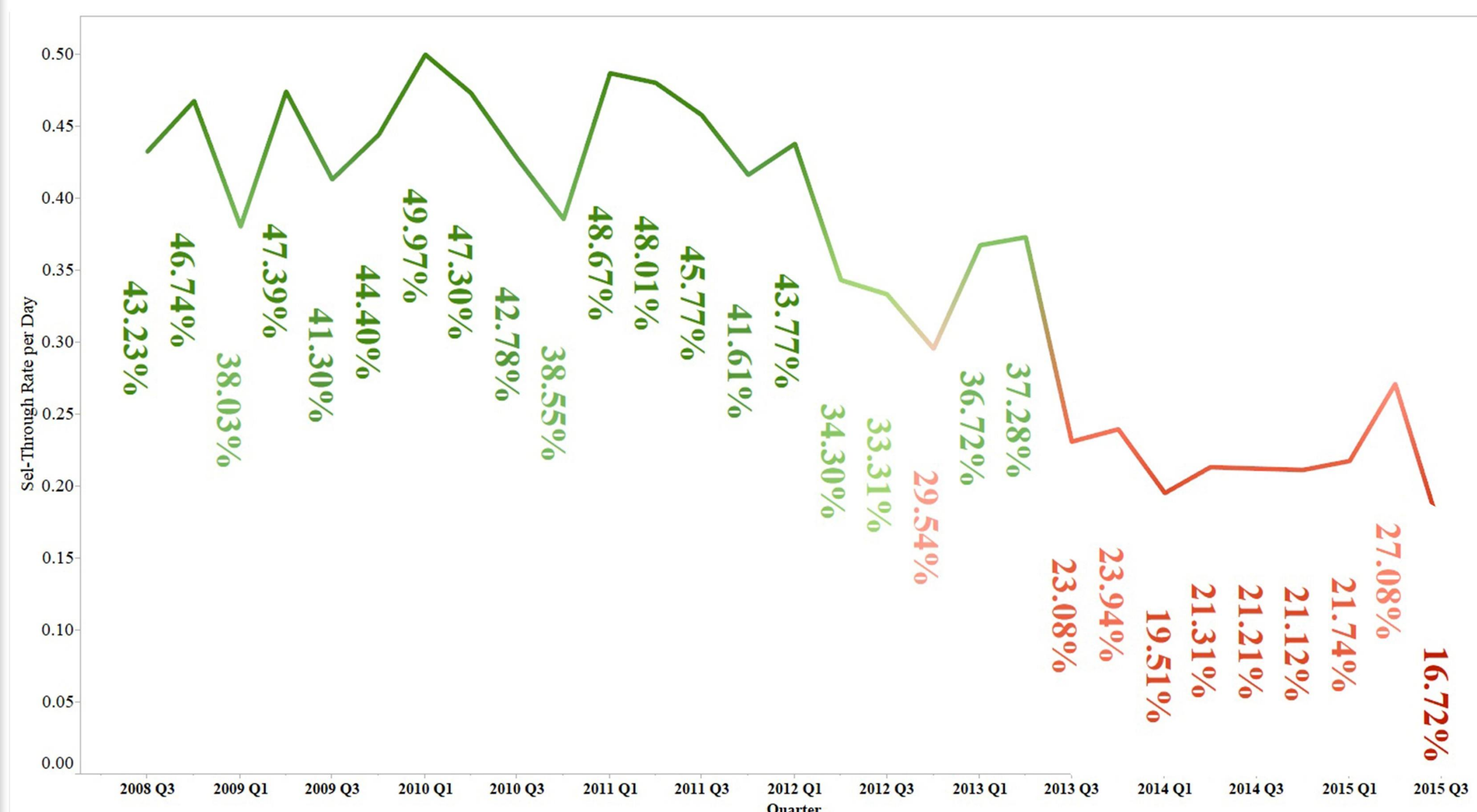
Combining the insights from the two analyses "Optimization of Looks Available" and "Learning from Successful Looks" provides a two-step solution for Gilt.com to improve sell-through rates:

Step 1) Determine the optimum number of looks to sell during any given month. This process is detailed in the panel to the left.

Step 2) Identify which specific looks have the highest propensity to meet or surpass a 40% sell-through rate per day. Successful characteristics are identified in the panel to the right.

Implications:
Following either of the above steps will theoretically yield a 40% sell-through rate. Using both steps in tandem would likely produce an even more advantageous result.

Improved sell-through rate per day would reduce costs in several ways: Inventory expenses and carrying costs would be reduced as more items within each look are sold. This would, in turn, simplify Gilt.com's supply chain by offering savings in logistics and fulfillment. Finally, administrative time spent updating the website would be reduced by selling a smaller number of looks at any given time. This would reduce cognitive jamming effects that may limit customers' willingness to make a purchase due to too many options being presented at once. Reducing the amount of looks sold would also improve customer experience on the website, improving brand loyalty and enhancing customer retention in the long run.

Further Research

While these conclusions have meaningful value, they are by no means conclusive. Based on the existing data, if other variables such as cost of goods sold and actual amount of units sold within each look were accessible, other areas such as profit maximization could have been explored. It would be particularly interesting to perform consequent analyses. Clustering based on different products could yield insights into how similar products behave and interact with each other. Similarly, market basket analysis would shed light on the buying behavior of individual customers. Regardless, we look forward to conducting further analyses to help Gilt.com streamline its business by reducing costs and increasing profitability.

Learning from Successful Looks
Random Forests and Subsequent Analysis

In the below analysis, we looked at the behavior of two different groups: those looks that sold-through at a per-day rate of 40% or higher, and those that performed lower than 40%. Within the data set, looks at or exceeding a 40% sell-through rate per day comprised 32.7% of all looks. After determining the variables that had the most impact, we drilled down deeper to determine the factors that distinguished the two groups from one another.

Accuracy: 10% of the data was saved as a test set. When this test data was run through the forest, looks that had a sell-though rate per day that was less than 40% were misclassified 49.5% of the time. Looks with a sell-through rate per day greater than 40% were misclassified only 5.5% of the time. Overall, this model is 64.5% accurate in determining which of the two categories a look would perform in.

Random Forest, Variable Importance Scores
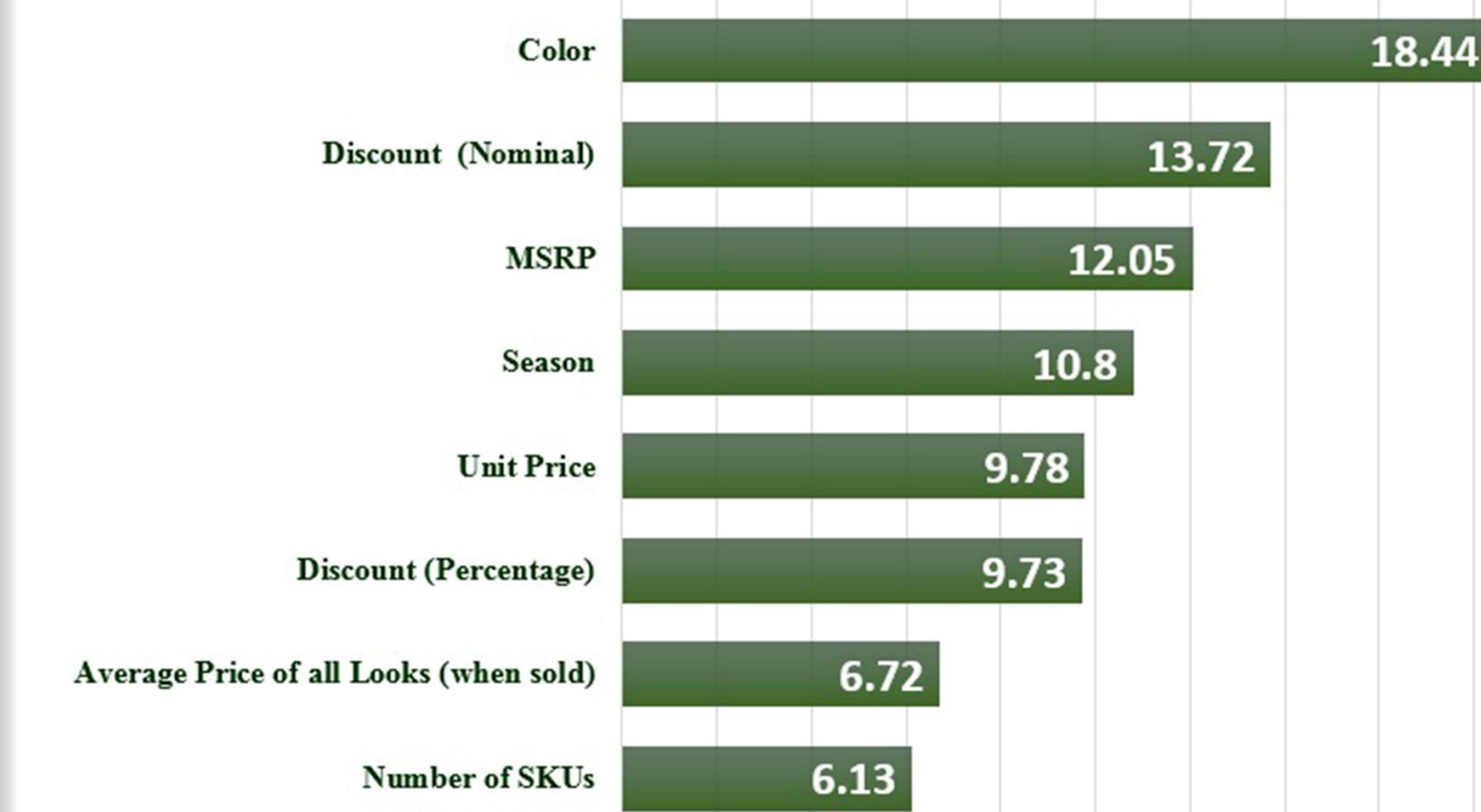
*The following were removed due to the fact that Gilt.com had little to no control of the variables:*

-Year
-Time of Sale End

*Variables with importance levels less than 6.00 were omitted from this exhibit.*

≥ 40% Sell-Through, Frequency by Color

Measure Names	Low Performing	High Performing	Difference
Avg. Unit Price	$ 211.64	$ 195.06	$ (16.57)
Avg. MSRP	$ 392.71	$ 386.62	$ (6.09)
Avg. Look Price			
Percentile In Sale	47.7%	42.1%	-5.6%
Avg. Discount			
Percentage	44.6%	48.4%	3.8%
Avg. Discount Nominal	$ 181.07	$ 191.55	$ 10.48
Avg Sale Look Price	$ 200.65	$ 195.84	$ (4.81)

≥ 40% Sell-Through by Season ID
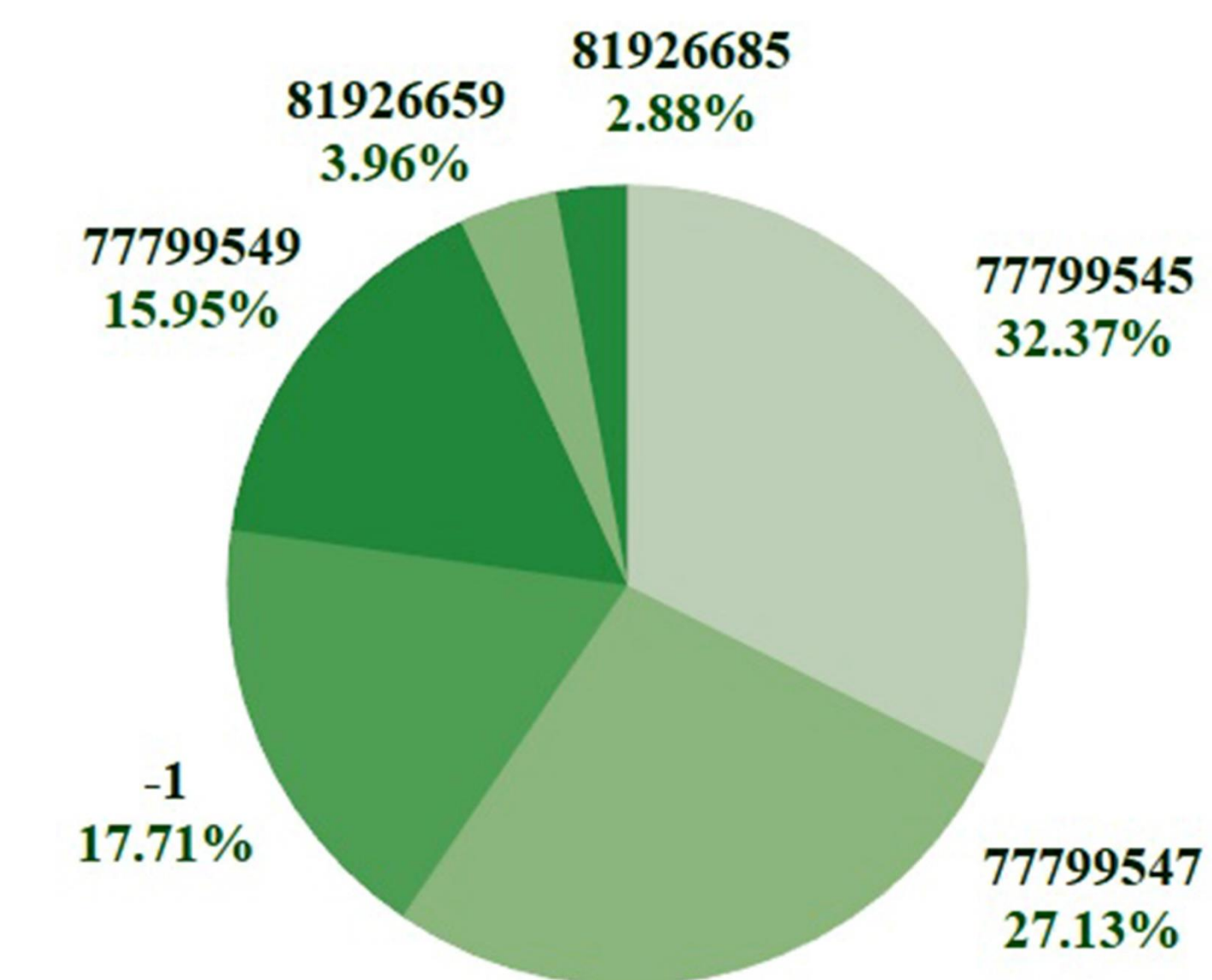
≥ 40% Sell-Through by Brand ID
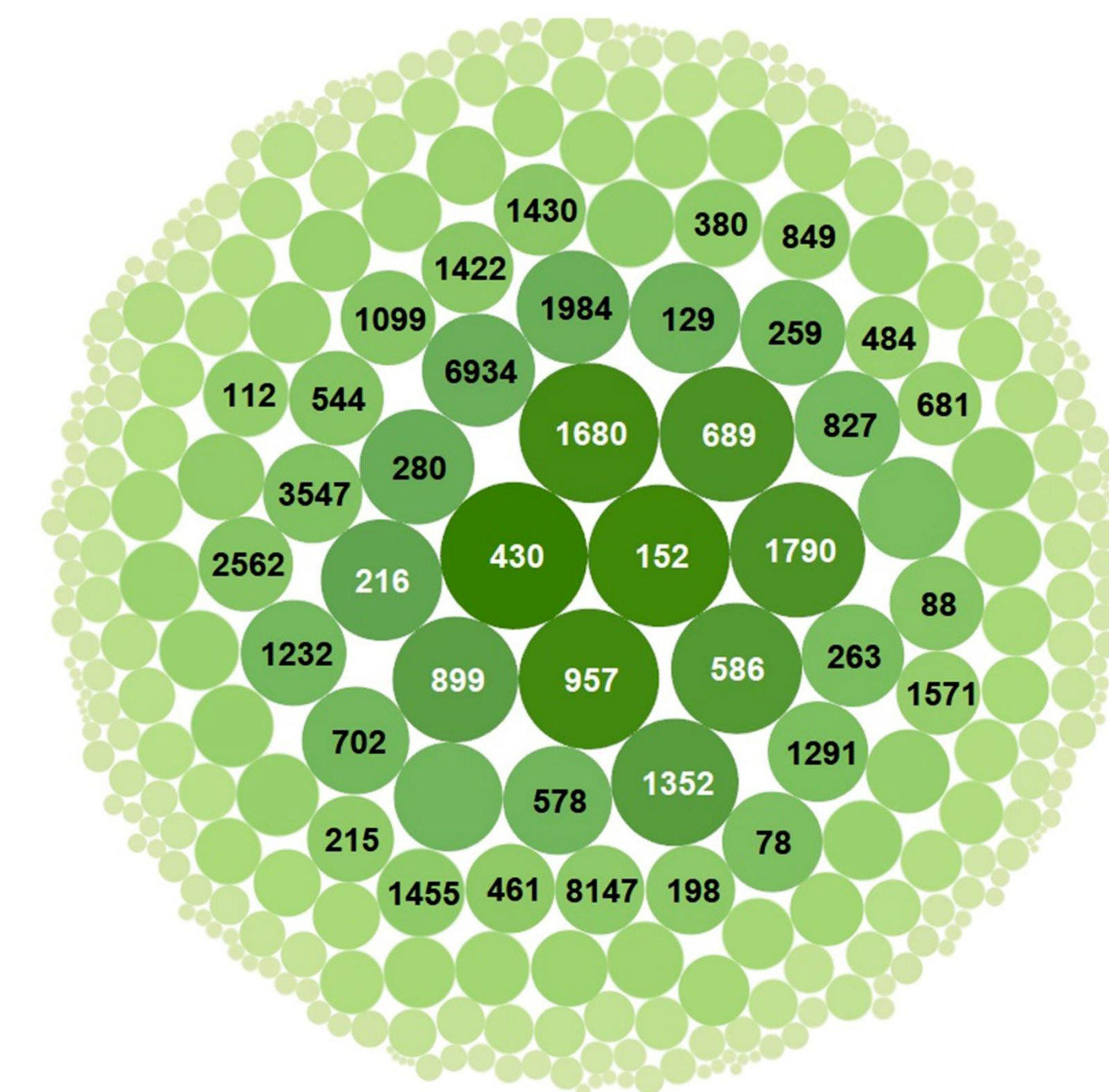
Key Takeaways:
There are several important attributes that can be controlled in order to increase the likelihood that a given look will sell-through at a higher (≥ 40%) rate per day. Gilt.com can use this information to make more optimal decisions in regard to which looks they offer and how they are priced. As shown by the above chart of importance, the main factors that distinguish which looks are ≥ 40% in sell-through rate per day are:

-- Season	--Unit Price	--MSRP
-- Color	--Discount (Nominal)	--Discount (Percentage)

Looks with higher discounts (both nominal and percentage) and lower prices were more likely to sell through at a per-day rate of 40% or higher.