

ROBERT H. SMITH SCHOOL OF BUSINESS
UNIVERSITY OF MARYLAND
Data Mining for Business (BUDT 733)
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Explaining Conversion Rate Factors of eBay Auctions

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ORIGINAL WORK STATEMENT

We the undersigned certify that the actual composition of this proposal was done by us and is original work.

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Executive Summary

BCIZ Inc. was founded in the spring of 2008 to research the factors leading to an eBay auction conversing. Our mission is to help eBay sellers have better success rates in their auction.

To start we decided to look at golf ball auctions; realizing that different factors can affect different items we looked at two different brands of golf balls: Callaway and Titlist. A model that explains only one brand is not as useful as a model that can explain a whole industry. BCIZ is going to provide our clients with simple easy-to-use models to understand the complex environment they operate.

For that goal, we collected 3 weeks of Callaway and Titlist auctions from the period of December 3 to December 23 2007. Each auction in our data contains information about the auction design (e.g., start price, duration, by-it-now option, etc) and the seller name and attributes. Sellers' attributes include aggregated feedback score, postal code and registration date.

After doing our exploring of the data and the running a discriminate analysis model we have concluded the following facts:

1. BidIncrement - The higher the increment the more likely the auction is to transact
2. StartPrice – The lower the starting price the more likely the auction is to transact
 - o Depending on the StartPrice and the BidIncrement the auction may or may not reach the ReservePrice.
3. Duration – The shorter the duration the more likely the auction is to transact
4. Quantity – While there is not a big difference in the middle the auctions that sell really big batches have a higher chance to transact

The most surprising finding was that a high SellerFeedbackScore resulted in a lower transaction rate. This goes against domain knowledge therefore further research needs to be done before a concrete conclusion can be made.

It is BCIS's recommendation to our clients that they setup auctions with a low start price and make the bid increment high. Every auction had a reserve price so the seller is not a risk by starting with a low price. Also, while auctions with average quantities showed no different in conversion; auctions with large quantities showed a higher conversion rate. Therefore, to have a higher conversion rate the seller should sell golf balls in large packs.

Our recommendations are robust for both Titlist and Callaway golf ball. Therefore BCIZ believes that the model can be expanded out to auctions of same products of different brands. However, extending the model to other product categories requires further exploration.

Those have been the finding for BCIZ's 2008 eBay report; please stay tuned for next year's continued analysis.

Technical Summary

As more people use the internet to sell items an evaluation of the new medium is needed to determine the best practices and which factors influence the ability of an item to sell. To analyze this data we chose eBay to determine the product and user characteristics which influence a successful sell (conversion). eBay is the largest online auction site of the \$60 Billion dollar online auction market.

To collect the data we developed a data collector that accesses eBays' publicly available databases. We retrieved data of Callaway and Titleist golf balls for a period of 3 weeks. We preprocessed the data by:

1. Transactions that offer items to more than one customer have been removed from the dataset
2. We parsed the title to extract the *quantity* and existence of *logo*.
3. We added an indicator of whether the auction has a buy it now option

Other calculated variables, as day-of-week, weekend flag, and seller state did not show any significance on the results, and thus we do not list them in the report.

We used Spotfire to explore the data. We examined the distribution of the variables, and their effect on conversion rate. We found the following variables correlated with conversion rate:

- haslogo
- quantity
- duration
- haveBuyItNow
- startPrice
- sellerFeedbackScore
- bidIncrement

Exhibit A depicts the results. We visually examined the possibility of interaction terms, yet found none.

We considered three possible methods: discriminate analysis, classification trees and logistic regression. We evaluated each model based on the error rates and domain knowledge of the online market. While classification trees had the lowest error rate of 28.3% and 20.3 for Callaway and Titleist respectively, it has two drawbacks. First, the model differed slightly between the two brands of golf balls (not robust). Second, was the difficulty in analyzing all variables for their effect on conversion. Exhibit B represents the classification tree results.

Discriminate analysis and logistic regression had slightly higher error rates of 30% for Callaway and 21% for Titleist but gave greater insight into the factors that effect conversion rates. The models were very similar in their results, yet DA had slightly lower error rates and explained the effects of each variable better.

Discriminate analysis models;

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The discriminate model shows that the starting price followed by the seller feedback score are the two most influential factors affecting the conversion rate for these auctions.

Recommendations

Our top recommendation for eBay sellers is to lower the starting price for an auction. When eBay sellers start their auction low they can set a high reserve price and therefore counteract the risk of selling below cost. Other possible actions (which have a smaller effect) are:

- Increase the bid increment
- Having a Logo decrease the chance of selling
- A shorter duration of auction increases the chance of selling

While quantity did not significantly affect the conversion rate overall, when quantity was very high (at the wholesale level) it did increase the conversion rate. However, when researching this trend the average price per ball fell as a result and profits would suffer. We believe that large quantities show auctions where buyers are looking for deals on bulk products but more research is needed to validate this hypothesis.

Seller feedback score was shown to negatively affect the conversion rate and was the single best predictor of the success of an auction. However, this is counter intuitive to our domain knowledge and we question the validity of this result. Our recommendation is to gather more evidence by setting up a different user for sellers with high feedback scores and to compare conversion rates between the two accounts. Several scenarios exist for a negatively correlated feedback score and conversion rate. Scenario one: buyers on eBay are trying to buy from other users and not “mega-sellers”. User’s associate high feedback scores with “megasellers” who accumulate high feedback scores through selling many items. Due to this preference, users buy a smaller proportion of items from these “megasellers”. Scenario two: Sellers with high feedback scores post many auctions on the same day, significantly increasing the supply of golf balls. This extra supply exceeds demand and therefore some of the supply will not be bought corresponding to a decrease in conversion rate. Both of these scenarios require more data than we currently have and we recommend proceeding with a trail account would be the best action with the lowest risk.

Exhibit A:

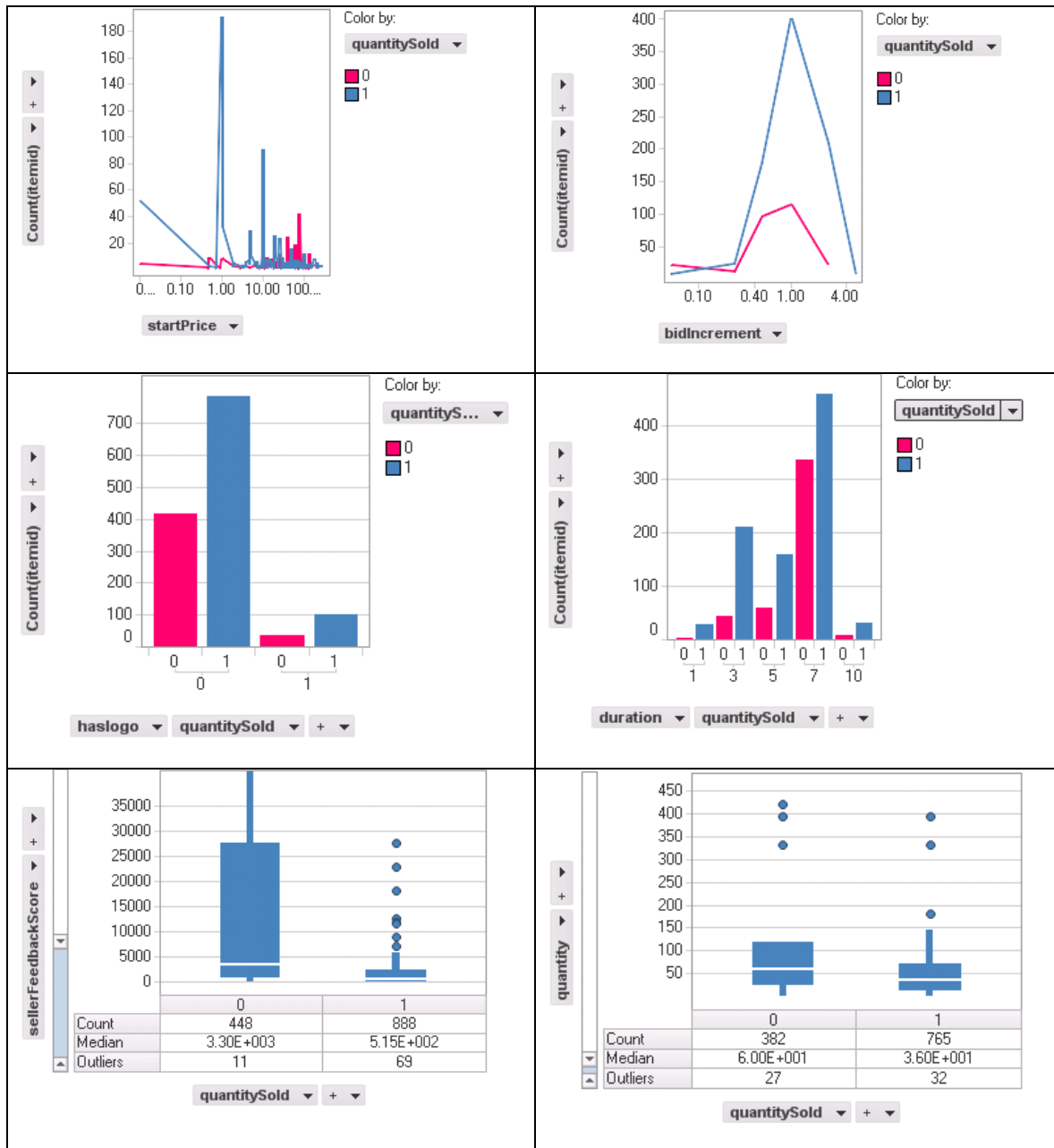


Exhibit B

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