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A Picture is Worth $84: An Examination of Consumer Behavior on Ebay Motors

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ABSTRACT
Although Ebay is renowned for its vastly successful Internet auction site, few people realize that it has emerged as the world’s largest automobile marketplace. Building on past research, this study examines consumer behavior on Ebay Motors, focusing on the variables that impact winning bid prices in automobile auctions. A major finding is the strong relationship between the number of digital images in the auction listing and the selling price.

Keywords
Ebay, Ebay motors, automobile sales.

INTRODUCTION
What product generates the most revenue for eBay? Many people are surprised to learn that the answer is automobiles. It may seem ironic that a product that requires such a substantial investment and carries such a great degree of risk could be traded using a site originally developed for trading Pez dispensers. Nonetheless, not only has eBay become a legitimate channel for automobile sales, it has, in fact, become the world’s largest automobile marketplace.

Ever since the emergence of eBay as a phenomenon of the Internet age, academic researchers from various disciplines have collected eBay data to examine consumer behavior in Internet auctions. Most of these studies have examined standardized products (such as computers and disk drives) or collectibles (such as coins and stamps). In recent years, businesses of all sizes have recognized the potential of using eBay as a channel for products of various types. As the focus of eBay has expanded beyond a collectables trading site, it becomes an even more valuable source for E-business researchers.

Previous research has examined the relationship between user reputation (using eBay’s feedback ratings) and auction pricing. This study will examine these relationships as they pertain to automobile pricing. We also examine some additional relationships particular to automobile auctions, including the impact of seller type (dealer or individual) and the number of digital images included in the auction listing. The results of this study will extend the knowledge of consumer behavior in Internet auctions using an important emerging product type. The remainder of this paper is organized as follows: In section II, we briefly describe eBay Motors’ rating system and listing functions, provide background information on the use of the Internet as a channel for auto sales, and summarize previous research on auction pricing and reputation. In section III, we describe the study’s methodology, providing a description of variables and hypotheses. In section IV, we provide preliminary results and discussion based on an initial sample of 47 auction listings. Finally in Section V, we provide conclusions and describe future directions for this line of research.

BACKGROUND AND LITERATURE REVIEW

Ebay Feedback and Listings
Using the same reputation system as eBay’s traditional site, users of eBay Motors have official reputations represented by a “feedback profile”. After a transaction has been completed, eBay trading partners have the opportunity to rate their partner by leaving either a positive, negative, or neutral comment of up to 80 characters in length (see Figure 1). As a member accumulates feedback, a user rating is calculated with each positive comment earning +1 points, each neutral comment earns +0 points and each negative comment earns −1 points (eBay Feedback Forum, 2004). This rating and the percentage of feedback rated positively are prominently displayed next to the users’ ID (see Figure 2). Though not required, participation levels at eBay are remarkably high as buyers leave feedback on sellers 52.1% of the time and sellers on buyers 60.6% of the time (Dellarocas, 2003). Once left, a comment cannot be edited and becomes a permanent part of the feedback profile. Thus, a negative or even a neutral rating can be detrimental to the user’s ability to sell in the eBay community in the future.
eBay Motors auction listings contain fundamental bidding data such as the winning bid, ending date and time, number of bids, etc. The listings also allow sellers to provide a formatted web page that describes the vehicle and contain multiple pictures that can be enlarged to show details. The description and pictures of the vehicle are very important in overcoming the limitations of an online automobile marketplace. A previous study (Sena et al, 2004) suggests that the quality of an auction’s description might impact the final winning price of the auction.

It is important to note that, like traditional eBay auctions, eBay Motors utilizes proxy bidding (users specify their highest price and the system automatically increases winning bid when necessary), which means that the final bid price is typically determined by the second highest bidder. For example, if the winning bidder listed $10,000 as the highest amount they would be willing to pay, and, ultimately, the second highest bidder placed a bid of, say, $9500, then the winning bidder would pay $9600 (the second place amount plus an increment of $100).

Research on Internet Auctions
With the success of eBay, a number of studies have examined various measures of reputation on the likelihood of successful sales occurring and, in particular, on the final prices for goods sold in online auctions (Sena et al, 2004). Table 1 summarizes the results of various studies that have examined the impact of feedback on ratings. Such studies have yielded conflicting results as to the relationship between reputation and winning bid prices on eBay. For details on prior research, please see Dellarocas (2003).

<table>
<thead>
<tr>
<th>Positive Feedback Effect on Winning Bid Price</th>
<th>Negative Feedback Effect on Winning Bid Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases</td>
<td>Increases</td>
</tr>
<tr>
<td>No Effect</td>
<td>No Effect</td>
</tr>
<tr>
<td>Reduces</td>
<td>Reduces</td>
</tr>
<tr>
<td>Not Tested</td>
<td>Not Tested</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Increases</th>
<th>No Effect</th>
<th>Reduces</th>
<th>Not Tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lee, Im, and Lee (2000) – Computer Equipment - though only for used</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Net score increases price</th>
<th>Cabral and Hortacsu (2003) – coins, Beanie Babies, and laptop computers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dewan and Hsu (2001) – Stamps</td>
</tr>
<tr>
<td></td>
<td>McDonald and Slawson (2002) – Dolls</td>
</tr>
<tr>
<td></td>
<td>Sena et al. (2004) – Designer watches and DVDs</td>
</tr>
</tbody>
</table>
The Internet Auto Market

eBay Motors (www.ebaymotors.com) a division of the online auction site, introduced used car buyers and sellers to their bidding process with a category dedicated to cars in 1999. eBay Motors was started as a separate division in April of 2000, with sales of $1.5 billion in cars and parts in their first full year (Wingfield and Lundegaard, 2003). In 2002, they sold 300,000 vehicles, while attracting more than 6.1 million unique visitors in the month of February. Total sales for 2002 represented 25% of eBay’s gross merchandise (Cumeo, 2002). Sales volume increased to 500,000 per month by 2003 and was expected to reach 1 million per month by 2004. Revenues have been forecast to reach $3 billion for 2005, potentially qualifying eBay Motors for Fortune500 status (Verma, 2003). While initial listings concentrated more on exotic and high-end vehicles, according to Simon Rothman, originator of eBay Motors and vice president of eBay’s U.S. operations, cars like the Ford Taurus and Honda Accord top the sales list (Automotive News, 2003).

While eBay Motors has emerged as the leader in Internet car sales, AutoByTel (www.autobytel.com) introduced on-line car buying to the general public in 1995. While initially focusing on new car sales along with CarsDirect (www.carsdirect.com) they have both more recently entered the used car market. AutoTrader (www.autotrader.com) began exclusively as an online used car dealer as AutoConnect in 1998. They now list more than 2 million used vehicles from private owners and dealers. Cars.com (www.cars.com) also launched in 1998 by pulling used “vehicle listings from thousands of dealer inventories and classified ads nationwide.”

Selling cars on the internet also has its drawbacks. Online sellers have to contend with frugal buyers searching for a bargain, possibly leading to a lower sale price. While this lower revenue may be offset by reduced costs for dealers, along with quicker sales for both dealers and private owners, according to estimates by the Goldman Sachs Group, only “about 30% of auto listings on eBay close with a winning bid.” (Wingfield and Lundegaard, 2003).

Chip Perry, President of AutoTrader (www.autotrader.com) notes that their company research shows that online used car sales “are inherently limited by the fact that consumers are reluctant to make purchases sight unseen.” (Cumeo, 2003) His site has recently entered the auction car sales market as direct competitor to eBay, and offers a “conditional bidding” process where the winning bidder is not obligated to buy until the car’s condition has been verified by an inspector. eBay also makes a special effort to “build trust, confidence and support to both buyers and sellers”, by insisting on ethical behavior. Feedback about both the seller and buyer are readily available, and a strict set of “rules” govern transactions. For instance, “eBay will throw out a seller who regularly receives negative feedback.” (Piszczalski, 2003) “Most vehicles on eBay come with protections such as purchase insurance at no extra cost.” Cars that are never delivered or misrepresented are insured for up to $20,000. These extra efforts by online marketers seem to have had an influence on the car-buying public. While many shoppers still choose to buy locally, “three-quarters of all car sales on eBay involve out-of-state transactions.” (Wingfield and Lundegaard, 2003).

For the buyer, online vehicles sales seems to be a shopper’s mecca. At any given moment, a shopper may find 20,000 cars listed just on eBayMotors (Fahey, 2003). Hundreds of choices for a given car model, such as Honda Accord, may be available at any given time. With multiple search options, buyers have the ultimate flexibility in comparison shopping. They also have a wealth of information about the vehicle immediately available, and may contact the seller for further details for clarification.

Still, as with used-car buying in general, some shoppers are happy and some are not. Reports of misrepresentation and fraud occur for online sales as well as for the stereotypical used-car lot. Some dealers who have tried online sales have also been disappointed and internet car sales have not yet had a serious impact on traditional sales. Although a few dealers are changing their way of business, moving from the traditional car lot to exclusive online sales, only 0.6% of the 43 million used-cars sold annually are sold on eBayMotors. (Wingfield and Lundegaard, 2003)

RESEARCH QUESTIONS AND METHODOLOGY

In February of 2004, 47 observations were collected from completed eBay Motors auctions. As described in Table 2, two reputation variables were collected from eBay listings: seller percent positive, and seller feedback rating. The feedback rating serves as a measure of the seller’s experience, proxied by the seller’s number of previous feedback responses. These variables are generally the only measures of seller reputation that eBay buyers observe as they are displayed on the main auction listing.
Our data includes only auctions offering Honda Accords made between the years 1992 and 2003 with winning bid prices between $4000 and $20,000. Data was only collected on completed auctions in which the “reserve price” (minimum seller is willing to accept) was met and in which the automobile is described as being in good condition. Autos that had been damaged or salvaged were not considered. Using the data on the auction listing, “blue book” values were collected for each vehicle using the Kelly Blue Book web site (kbb.com). If the necessary data was not included in the listing (model type, options, etc.) the observation was not included in the data set.

<table>
<thead>
<tr>
<th>Winning Bid Price:</th>
<th>Includes only completed auctions where bid price exceeds “reserve price” (the minimum price specified by the Seller)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Book Value:</td>
<td>As listed by Kelley’s Blue Book (kbb.com).</td>
</tr>
<tr>
<td>Price Ratio – the ratio of (Winning Bid Price / Blue Book Value)</td>
<td></td>
</tr>
<tr>
<td>Seller’s Feedback Rating -</td>
<td>(serves as an estimate of seller experience)</td>
</tr>
<tr>
<td>Seller’s Percent Positive:</td>
<td>number of positive ratings divided by the total number of ratings (positive, negative, and neutral)</td>
</tr>
<tr>
<td>Number of Pictures –</td>
<td>the total number of unique images that users can access within the listing</td>
</tr>
<tr>
<td>Dealer –</td>
<td>whether or not the listing indicates that the seller is an automobile dealership (as opposed to an individual seller)</td>
</tr>
</tbody>
</table>

Table 2: Description of Variables

Based on these variables, some interesting research questions emerge. Prior research has indicated, with some exceptions, that seller feedback (among other variables) correlates positively with winning bid prices. Since our study involved vehicles with varying model types (e.g., DX, LX, EX), mileage, and options, the Price Ratio is the primary dependent variable of interest. This ratio serves as an indication of the percent of retail value that an auction listing achieved. The following hypotheses will be examined in this study:

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Seller’s Feedback Score will correlate positively with Price Ratio</td>
</tr>
<tr>
<td>H2</td>
<td>Seller’s Percent Positive will correlate positively with Price Ratio</td>
</tr>
<tr>
<td>H3</td>
<td>Number of Pictures will correlate positively with Price Ratio</td>
</tr>
<tr>
<td>H4</td>
<td>Dealer will correlate positively with Price Ratio (dealers will gain higher Price Ratio than individual sellers)</td>
</tr>
</tbody>
</table>

Table 3: Hypotheses Tested

STATISTICAL ANALYSES AND FINDINGS

As shown below in Table 4, the transactions in our sample had winning bid prices ranging from just over $4000 to just less than $19,000 with an average value of $7797. The primary variable of interest, Price Ratio, indicates that Honda Accords sell for an average of 68% of their Kelly Blue Book value on eBay Motors. 70% of the transactions in our sample were listed by dealers. The autos were an average of 5.89 years old based on model year. Sellers included an average of nearly sixteen images in their auction listings.
Table 4: Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price Ratio</td>
<td>48.2%</td>
<td>93.1%</td>
<td>68.1%</td>
<td>11.8%</td>
</tr>
<tr>
<td>Winning Bid Price</td>
<td>4,050</td>
<td>18,900</td>
<td>7,797.12</td>
<td>3,409.70</td>
</tr>
<tr>
<td>Blue Book</td>
<td>5,825</td>
<td>20,650</td>
<td>11,379.36</td>
<td>4,011.04</td>
</tr>
<tr>
<td>Seller Feedback Score</td>
<td>0</td>
<td>703</td>
<td>75.72</td>
<td>132.62</td>
</tr>
<tr>
<td>Seller Positive Percent</td>
<td>0</td>
<td>100</td>
<td>93.30</td>
<td>20.34</td>
</tr>
<tr>
<td>Dealer?</td>
<td></td>
<td></td>
<td>70%</td>
<td>0.46</td>
</tr>
<tr>
<td>Number of Pictures</td>
<td>4</td>
<td>36</td>
<td>15.94</td>
<td>8.41</td>
</tr>
<tr>
<td>Age of Automobile</td>
<td>1</td>
<td>12</td>
<td>5.89</td>
<td>2.81</td>
</tr>
</tbody>
</table>

Table 5 contains Pearson Correlation coefficients for each variable in the study, including those listed previously in the hypotheses (Table 3). The correlation between Seller’s Feedback Score and Price Ratio is .21, which in this sample, is not significant. However, as more observations are recorded, this hypothesis may eventually be confirmed. It is somewhat surprising, however, that a stronger relationship was not found between Price Ratio and Seller Percent Positive with an insignificant correlation of .08. Most notable is the strong relationship between Price Ratio and Number of Pictures (correlation coefficient of .41). This indicates that listings with a greater number of pictures achieve higher bid prices relative to Blue Book values. Finally, the correlation between Dealer and Price Ration was positive (.20) but not statistically significant. However, a comparison of means shows that, given this limited sample (with 33 dealer listings and 14 listings offered by individuals), dealers are able to realize just under 70% (on average) of Blue Book value while individuals have an average ratio of just under 65%. Thus, preliminary evidence suggests that there may be a difference but our sample was not large enough to make the difference statistically significant.

The correlation matrix also reveals some additional statistically significant relationships. Obviously, the strong correlation between Blue Book value and winning bid price would be expected. The other significant relationships are likely to be related to one another. There is a positive relationship between the number of pictures and Dealers, indicating (not surprisingly) that dealers provide a greater number of pictures of the automobile. Similarly, sellers with a higher feedback score (i.e., more experienced sellers) also provide a greater number of pictures. While the relationship between Seller Feedback and Dealer is not significant, this relationship may be clouded by the fact that individual sellers also have other eBay sales and purchases included in their feedback rating.

Table 5: Correlation Coefficients

<table>
<thead>
<tr>
<th></th>
<th>Price Ratio</th>
<th>Winning Bid Price</th>
<th>Blue Book</th>
<th>Seller Feedback Score</th>
<th>Seller Positive Percent</th>
<th>Dealer?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winning Bid Price</td>
<td>.49**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue Book</td>
<td>.11</td>
<td>.91**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seller Feedback Score</td>
<td>.21</td>
<td>(.09)</td>
<td>(.19)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seller Positive Percent</td>
<td>.08</td>
<td>.02</td>
<td>(.01)</td>
<td>.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dealer?</td>
<td>.20</td>
<td>.10</td>
<td>.01</td>
<td>.20</td>
<td>.07</td>
<td></td>
</tr>
<tr>
<td>Number of Pictures</td>
<td>.40**</td>
<td>.04</td>
<td>(.16)</td>
<td>.30*</td>
<td>.14</td>
<td>.47**</td>
</tr>
</tbody>
</table>

** significant at p<.01
*  significant at p<.05

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Finally, on an exploratory basis, we perform a linear regression with Winning Bid Price as the dependent variable and Blue Book Value, Seller Feedback Score, Seller Percent Positive, Dealer, and Number of Pictures as independent variables. As shown in Table 6, with all independent variables included in the model, only Blue Book value and Number of Pictures are statistically significant. When a stepwise model is performed, these variables have a nearly identical R squared value indicating that the amount of variation does not diminish when only these two variables are included in the model. Finally, it is interested to note that in the final model, the incremental value of a picture on the winning bid price is $86.14. While much more data would be needed to confirm this finding, it certainly identifies an area that would be worth investigating.

**Multiple Regression:**

**Model 1**

\[
\text{Winning Bid Price} = B_0 + B_1(\text{Blue Book Value}) + B_2(\text{Seller Feedback Score}) + B_3(\text{Seller Percent Positive}) + B_4(\text{Dealer}) + B_5(\text{Number of Pictures})
\]

**Model 2** (stepwise)

\[
\text{Bid Price} = B_0 + B_4(\text{Blue Book Value}) + B_5(\text{Number of Pictures})
\]

**INDEPENDENT VARIABLE** | **COEFFICIENT** | **T**  
--- | --- | ---  
Constant | -2487 | -2.1*  
Blue Book Value | .79 | 15.1**  
Seller Feedback Score | 0.30 | .16  
Seller Percent Positive | -.92 | -.09  
Dealer | 15.96 | .97  
Number of Pictures | 84.71 | 2.82**  

**Model 1: All variables**

**INDEPENDENT VARIABLE** | **COEFFICIENT** | **T**  
--- | --- | ---  
Constant | -2546 | -3.4**  
Blue Book Value | .79 | 16.1**  
Number of Pictures | 86.14 | 3.55**  

**Model 2: Stepwise Regression (only two variables entered)**

**CONCLUSIONS**
This study performs a preliminary analysis of the impact of seller reputation and auction attributes upon bid prices in eBay Motors. The authors plan to collect a great deal of additional data to further examine these relationships. The study could be further extended by examining additional types of vehicles or by extending (or limiting) the model years, types, etc. Under a limited data set, this study reveals some interesting insights into consumer behavior on eBay Motors. In particular, the study identifies that including numerous pictures may be a very important element in selling autos via Internet auctions. Clearly, further studies should be conducted to better explore these relationships.

REFERENCES


