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The Determinants of Price in Internet Auctions of Used Cars

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Abstract This study analyzes how auction, seller, and product factors influence the price premium in an eBay used car auction market. In auctions with at least one bid, the reputation of the seller, title status, and the time the auction ended influenced the price premium on the highest bid. For auctions that resulted in a sale, cars with clear title and dealers were able to secure significantly greater price premiums, but seller reputation had no significant effect. Using a binary logit model, cars had a greater probability of selling if the seller had a better reputation. The quality of the presentation and number of pictures did not enhance the price premium in any of the models.

Keywords car auctions · internet auctions · pricing factors

JEL Classifications D44 · D82 · L14

Introduction

E-commerce has become a larger part of the U.S. and world economy over the last decade. Americans were expected to spend approximately $120 billion online in 2004 (Economist, 2004a). Forrester Research believes that number will double by 2007 (Mullaney, 2004). Since 1999, E-commerce retail sales have grown at an annual rate of 34% (Willis, 2004). Internet auction sales, which are a part of the E-commerce market, have grown even more rapidly. Sales on eBay, the largest online auction company, grew 51% in 2002 and 60% in 2003. eBay's total gross sales amounted to $24 billion in 2003 (Bajari & Hortacsu, 2004; Economist, 2004b).

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Growth in used car on-line auctions has been just as impressive. The $81 billion North American used car auction business has been transformed by the internet. General Motors, Honda Motor Co. and DaimlerChrysler now sell off-lease vehicles through internet companies like AutoTradeCenter, Inc. Independent auto auctioneers have begun to add internet sites to their more traditional live auctions. The largest used-car wholesaler, Manheim Auto Auction, saw internet sales increase 30% during 2003 to 150,000 cars out of 5,000,000 cars sold (Angwin, 2003). In contrast to used car only websites, eBay's auction site sells a variety of new and used products. Surprisingly, eBay's used car category has become its most valuable selling category with $8 billion in used cars and parts sold in 2004 (Economist, 2004a). eBay is the leading online used car dealer with over 300,000 cars sold in 2002 (Krause Fund Research, Fall 2003).

Given the growing importance of the used car market in internet auctions, this study builds on previous studies of internet auction markets to determine how auction and seller factors influence the price premium on used cars. Although a number of studies have examined the effect of factors such as reputation and auction characteristics on price, their focus has been on relatively low priced homogenous products. According to Bajari and Hortacsu (2004), this has limited the usefulness of such studies. In contrast to the market for lower priced homogeneous goods, one might expect seller and auction characteristics to play a greater role in determining the prices paid for higher priced heterogeneous products.

Literature Review

Whether the market is electronic or not, price and profit margin are influenced by many factors. In an auction market, seller and auction characteristics probably play a significant role in establishing a final selling price. Seller characteristics include the reputation of the seller and whether the seller is a business or an individual. Auction characteristics relate to the timing of the offering, and the display and presentation of the product. In the case of an internet auction market for a heterogeneous good like used cars, the display can range from a professional presentation with 30–60 pictures of the product to an informal presentation with just a few pictures. For economists, the internet auction market has become a real world laboratory in which to examine how these factors affect price and price premiums.

Seller Reputation and Trust

A number of studies on internet auctions (Ba & Pavlou, 2002; Dewan & Hsu, 2004; McDonald & Slawson, 2002; Standifird, 2001; and others as discussed below) have found a relationship between trust and internet auction sales and/or prices. A good reputation helps establish the trust necessary for a transaction to take place. According to economic and marketing theory, a successful transaction will occur only when a seller and buyer trust one another (Swan & Nolan, 1985). A lack of trust can cause market failure (Akerlof, 1970; Choi, Stahl, & Whinston, 1997; Granovetter, 1985; Jarvenpaa, Tractinsky, & Vitale, 2000). Trust is required because

in most markets both the buyer and the seller incur risks. The buyer bears two types of risk: transactions risk related to the seller's honesty and ability to perform, and information asymmetry concerning the quality of the product itself (Akerlof, 1970; Mishra, Heide, & Cort, 1998). The seller's primary risks are the possibility of non-payment resulting in a delayed sale and, in the case of an auction, the possibility of a lower price resulting from the auction process. The buyer's risk exceeds that of the seller because the potential cost of information asymmetry is higher, and the techniques for avoiding such risk are not foolproof.

Transactions risk and information asymmetry are greater in an electronic market than in a traditional "brick-and-mortar" exchange, because the seller is often known only by an E-mail address. The faceless nature of an electronic transaction, as well as the separation of time and delivery, can lead to greater opportunistic behavior on the seller's part as evidenced by fraud, misrepresentation of product characteristics, etc. (Lee, 1998; Mishra et al., 1998; Standifird, 2001; Williamson, 1993). For this reason, auction sites have developed numerous mechanisms to better govern the auction process and control risk. These mechanisms reduce risk for both buyers and sellers. For instance, many auction sites have developed diverse methods to rate a seller's reputation and punish sellers who engage in fraudulent transactions (Barney & Hansen, 1994; Walden, 2000). Sites also have developed methods to help reduce seller risk. eBay and other sites have instituted mechanisms to guarantee payment and allow sellers to establish a "starting bid" and "reserve price" to reduce price risk.

Reputation ratings convey information about the credibility of the seller and, consequently, are a basis for establishing trust. Credibility-based trust has been recognized by marketing theorists as more important in one-time transactions, while benevolence trust is more important in repeated transactions (Ba & Pavlou, 2002; Doney & Cannon, 1997; Ganesan, 1994). According to Resnick and Zeckhauser's (2002) study of eBay transactions, 89% were one time interactions between buyer and seller; consequently, credibility trust as proxied by reputation ratings is expected to influence buyer behavior.

A number of studies have shown that the reputation of the seller can influence the price paid in an Internet sale. Ba and Pavlou's (2002) study of 18 homogeneous products found that the price premium (difference from average price) was influenced by the seller's positive ratings. McDonald and Slawson (2002) found that the final price in an auction of limited edition Barbie dolls was related to reputation such that a highly rated seller could earn an additional $12 per transaction. Standiford (2001) found that negative ratings had a stronger effect than positive ratings on final bid price in eBay auctions for Palm Pilot computers. In a study of the buying behavior of college students, Kim (2005) asked students what they would pay for a product under different hypothetical conditions. Kim found that reputation was positively related to price premiums that students said they would pay for camcorders, DVDs, and modems. Houser and Wooders (2006) found that reputation had a significant effect on the price of Pentium III processors, while Lucking-Reiley, Bryan, Prasad, and Reeves (2000) concluded that negative feedback had a more significant effect on the auction price of coins than positive feedback. Although Dewan and Hsu (2004) found that seller reputation influences price, the effect was very small with a 10% increase in seller rating resulting in a 0.44% increase in the

auction price of specialty stamps. In contrast, Resnick and Zeckhauser's (2002) study of two homogeneous goods auctioned on eBay concluded that neither positive nor negative feedback had a significant effect on price.

Trust and reputation are likely to play an even greater role when internet buyers bid on a heterogeneous product like a used car. In studies of collectibles by Jin and Kato (2002) and Ederington and Dewally (2003), reputation is more important in cases where the quality of the item is less easily established. In Melnick and Alm's (2005) study of collector coins, seller's reputation played an insignificant role in the price paid for coins that were certified (appraised) by an independent agent. However, reputation was significant when the coins were not independently certified and, therefore, more heterogeneous in quality. The impact of reputation became even greater when the coins were unaccompanied by visual scans (pictures).

Because the buyer of a used car is often paying a price in the thousands of dollars, the potential cost of information asymmetry is much higher than if the buyer were purchasing something that was relatively inexpensive. In Ba and Pavlou's (2002) study, negative ratings had a stronger effect on the price premiums for more expensive products, like VCRs and camcorders, than less expensive products. Melnik and Alm (2005) also found that negative ratings had a more significant effect on the price of more expensive certified coins (average price $328) than on the less expensive uncertified coins (average price $58).

After an exhaustive survey of the literature, Bajari and Hortacsu (2004) conclude that "the jury is still out on the effectiveness of the reputation systems implemented by eBay... There is still plenty of work to be done to understand how market participants utilize the information contained in the feedback forum system..." (p. 475).

Auction Characteristics

Studies have also found that auction characteristics can influence prices. For example, McDonald and Slawson (2002) found that shipping costs and when the auction ended had an effect on the final price for Barbie dolls. Shipping costs were inversely related to final price and auctions that ended between midnight and 4 A.M. received a significantly lower price. Whether the seller permitted payment with credit cards did not affect price.

In Yin's (2003) study of the auction market for used computers, well-designed presentations resulted in higher final prices because they reduced buyer uncertainty about quality. Ottaway, Bruneau, and Evans (2003) found that a photographic image of an item did not influence its final price.

According to Melnik and Alm (2005), coins that sold in auctions that ended on Saturday and/or Sunday earned a higher price. Method of payment and the availability of pictures (visual scans) were significant in the auctions for noncertified coins, but insignificant for certified coins.

Houser and Wooders (2006), McDonald and Slawson (2002), and Dewan and Hsu (2004) were unable to establish any relationship between the length of an auction and final price. In contrast, Lucking-Reiley et al. (2000) found that the length of an auction was positively related to price.

Houser and Wooders (2006) found that a retail package (unopened new product) is more likely to be sold at a higher price than used product. They hypothesize that this occurs because of the extended warranty attached to the retail package or greater certainty about the product's quality.

Other Seller and Buyer Characteristics

Other characteristics of the seller and buyer may affect the price paid in an auction sale. In a theoretical study, Mathews and Katzman (2006) conclude that the risk aversion of the seller may also influence the type of auction and the price. An eBay seller can offer a product at a predetermined price which allows a buyer who agrees to that price to immediately end the auction. Theoretically, risk averse sellers are more likely to offer their product at a lower price to obtain a sure sale and avoid the auction altogether. Since this study is unable to measure the risk aversion of a seller, it is not designed to determine the effect of seller risk aversion on final price.

With respect to buyers, three characteristics may influence the final price in an auction. According to Kim (2005), a buyer's propensity to trust, impulsivity, and attitude toward auctions may work to influence price. According to his results, less trusting, more analytical, and non-competitive bidders will pay less for a product. Buyer characteristics can either magnify or dampen the effect of seller reputation on bid price. According to Houser and Wooders (2006), buyer or bidder reputation did not significantly influence the price in internet auctions of Pentium III processors.

This study is not designed to determine how behavioral traits of sellers and buyers influence auction price. Instead, its goal is to evaluate how seller reputation ratings, as well as auction and product characteristics, influence price in an internet auction of a high-priced, heterogeneous product.

eBay Motors Auctions

Anyone with a car to sell and a computer with internet access can list a car for sale on eBay. Since the eBay used car market is an evolving one, features and listing prices change fairly frequently. The options and prices described below relate to the eBay market as it existed at the time of this study (2004). Listing a car on eBay costs $40, and there is an additional $40 fee for any car getting a bid. The fee is waived if no bids meet the seller determined reserve price (this reserve price is not known to bidders). In addition to the listing fees, sellers incur additional fees for adding pictures to the auction. Each picture after the first costs an additional $0.15; a package of 12 large pictures costs $2.40. When this study was done, eBay made the following claim in its description of the fees for pictures: "Picture Services listings are 9% more likely to sell with a 17% average increase in final price.*" The asterisk in the quote did not refer the reader anywhere.

It is also possible to use a service to enhance a presentation. CARad is an eBay company that competes with a number of other vendors. The CARad listing service offers a professional looking display with a larger number of pictures. Cost for these

services start at $9.95. According to eBay: "CARad helps put more money into your pockets."

A number of other listing enhancements are available with added charges. Featured items are those moved to the top of the list or page. The listing will appear under a heading titled "featured item." Featuring an auction costs an additional $19.95. An auction can be scheduled to begin and end at a specific time for an extra $1.

At the time of this study, eBay provided the STS (Short-term-service) warranty on used-cars. This warranty was a 1 month/1,000 mile limited warranty offered on all qualified vehicles without charge to the buyer or seller.

Finally, when an eBay auction ends with a sale, both parties are invited to give each other a feedback score (1=positive, 0=neutral, and −1=negative) via eBay's Feedback Forum. Each seller's listing includes his/her total feedback score and the number of positive, neutral, and negative ratings over the past month, past 6 months, and last year. The Feedback Forum is a bidirectional system in that sellers are given the opportunity to respond to buyers' negative comments. In addition, the detail of the comments allows buyers to qualitatively assess the risk related to the negative comments and responses.

Data and Methodology

The data were obtained from the eBay website summary of all auctions of Honda Accords during a three week period in summer 2004. The price and other factors were downloaded for over 600 auctions. Price information included the highest bid price, the selling price (if sold), and the number of bids. Other factors can be broken down into three groups: product characteristics, seller characteristics, and auction characteristics. Product characteristics relate to the used car and include year, model, color, mileage, transmission, engine size, whether the car had a manufacturer warranty, and what options the car had. The seller characteristics include reputation rating and whether the seller is a dealer or not. The auction characteristics include the number of pictures, whether a professional service was used to present information, and if the item was a "featured" item.

The market value of the car was determined from Kelly Blue Book (KBB) using the private party transactions price.[1] The KBB value is based on the car model, year, mileage, location (by zip code of the seller), transmission type, engine size, options, condition, and manufacturer warranties in existence. Options obtained from the full description on eBay, such as sunroof, leather interior, spoiler (rear or front), security systems, or power windows, must also be specified to obtain a value from KBB Using KBB criteria to determine the condition of a used car, the condition was evaluated as excellent, good, fair, or poor. To determine condition, the authors

[1] Although some sellers were dealers, the Kelly Blue Book dealer price was not helpful in establishing a market value because only a starting price is given regardless of condition of the vehicle. The private party transactions price varies according to the condition of the vehicle and, consequently, is more reflective of a negotiated market price.

analyzed each car by reviewing the pictures, the written description, and the title (clear, salvage, or other). Automobiles with poor condition were deleted from the sample because KBB does not estimate a value on cars evaluated as poor. The information listed in item titles or on the title page of the auction is often incomplete or incorrect. The detailed or full item description includes detailed information about the condition of the automobile, what options the car has, whether it has a warranty, etc.

To determine condition, the authors independently reviewed each automobile. Then, a comparison of the two authors' condition ratings was done for each car. In cases where the authors differed in their evaluation of the car's condition, the pictures and description were reviewed again until the authors came to an agreement on the condition.

Kelly Blue Book does not actually estimate a price for each zip code. The company divides the 50 U.S. states into four regions. The KBB price is the same for all states and zip codes within a region. With this knowledge, the authors chose one zip code for all cars from the same region. This alleviated the need to determine an exact zip code for each seller's location.

From the 600 auctions, approximately 163 auctions were removed from the sample for one or more of the following reasons: (1) the auction ended early because the item was no longer available for sale (usually due to a sale outside of eBay); (2) the auction ended early because of an error in the listing; (3) no picture was available so the condition could not be determined; or (4) the condition of the car was poor.

Table 1 summarizes the basic characteristics of the auctions in this study. Cars that sold during the period covered sold for between $500 and $21,000 with an average price of $6,437. Cars on average received just over 14 bids with many receiving no bids and no car getting more than 63 bids. The average car in the sample was 6 years old with approximately 76,000 mi.

Table 1 Price, product, seller, and auction characteristics for 437 eBay used car auctions

Price and Sales Information	
Percent of cars that were sold	34% (147 sold)
Price of sold cars	Average=$6437 (std. dev.=$4706) Max=$20,900; Min=$485
Premium on sold cars*	Average=$−604.27 (std. dev.=$1188) Max=$2665; Min=$−6330
Number of bids on offered cars	Average=14.3 bids (std. dev.=12.8 bids) Max=63; Min=0
Automobile Characteristics	
Age of offered cars	Average=6 years
Mileage of offered cars	Average=76,503.3 mi
Seller Characteristics	
Percent of sellers that are dealers	60.0% (262 dealers)
Auction Characteristics	
Percent of auctions with professional Displays	63.2% (276 displays)
Number of pictures	Average=17.2 pictures (std. dev.=11.6 pictures) Max=64; Min=0

*A negative premium means that the cars sold for on the average $604.27 less than the Kelly Blue Book value.

Model and the Variables

Three models were used to determine what factors influence the premium over Kelly Blue Book value or whether the car sold. In the first regression, the sample includes all car auctions with at least one positive bid. The dependent variable is the highest bid price minus the Kelly Blue Book value. If the highest bid is greater than the KBB value, the difference is referred to as a premium bid. If the highest bid is less than the KBB value, than the difference is referred to as a discount bid.

In the second regression, only auctions that resulted in a sale are included. The dependent variable is the sales price minus the Kelly Blue Book value. The seller receives a premium if the price is greater than the Kelly book value. The seller sells at a discount if the price is less than the Kelly book value.

The third model is a Logit model with a binary dependent variable: 1 represents the sale of the vehicle and 0 represents the non-sale of the vehicle. All variables are defined in Table 2.

The independent variables include car, seller, and auction characteristics. The car (product) characteristics include whether the car has a 1 month warranty and whether it has a clear title. As previously described, the warranty variable is based on whether the auto has an STS warranty provided free of charge to qualified sellers by eBay. Manufacturer warranties need not be included as a separate variable because they are related to the model year and miles driven. Consequently, they are part of the KBB value. The STS warranty is not included in the KBB value and, therefore, needs to be explicitly considered. If we assume that the STS warranty has value to the buyer, then cars with a warranty would be more likely to command a higher price.

With respect to the title, KBB does not attach a value to cars with a salvage title because it automatically rates them as poor condition. However, not all salvage cars are wrecks or non-drivable. The salvage title is sometimes given to cars that have

Table 2 Price premium, product, seller, and auction variables for eBay used car auctions (N=437)

Dependent Variables	Description
Model 1: KBB diffbid	Difference between the highest bid recorded (for cars that received at least one bid) and the KBB value (High bid – KBB)
Model 2: KBBdiffsold	Difference between the sale price (for cars that sold) and the KBB value (Selling price – KBB)
Model 3: Sold	Dummy=1 if car sold; 0 if car did not sell
Independent Variables	
Warranty	Dummy=1 if car qualified for a free limited 1,000 mi, 1 month warranty
Clrtitle	Dummy=1 if the title was clear (not salvage or other)
Dealer	Dummy=1 if the seller identified him/herself as a professional dealer
Lnpics	Natural logarithm of the number of pictures included in the display
Profdisp	Dummy=1 if the seller used a display service
Aftfive	Dummy=1 if the auction ended between five PM and midnight
Featureitems	Dummy=1 if the item was listed using the “featured item” option
Rep	Total feedback score (sum of positive minus sum of negative feedback scores)
PctRep	Percentage of feedback that was positive

been stolen and recovered as well as cars that have been completely rebuilt. Cars given the salvage title for these reasons were kept in the sample and rated as fair. A fair rating allows a KBB value to be determined. The authors hypothesize that cars with a clear title are more likely to command a higher selling price and more likely to be sold.

The seller characteristics are whether the seller is a dealer and the seller's reputation. The sign of the dealer variable is difficult to predict. One could speculate that a dealer is more likely to earn a higher final price because in many cases the authorized dealer has greater experience in the online auction market than a non-dealer. That experience may lead to a higher reserve price such that a sale will result in a higher final price. The seller's motivation may also influence the selling price. For instance, a dealer with excess inventory may be anxious to dump the inventory to reduce carrying costs. Such a dealer may be willing to accept a smaller profit margin in any given sale. In addition, dealers may be dealing with a greater sales volume which allows them to sell cars at a lower profit margin with the hope that they can make up the difference in volume. The reserve price also relates to behavioral finance. It is well known that sellers attach greater value to objects they own and are personally attached to. This personal attachment could cause individual sellers to set the reserve price too high which would lead to non-sale and/or sale at a higher price.

Based on previous studies, we hypothesize that a seller's reputation score is positively correlated to price premium. In addition, we hypothesize that a higher reputation score will result in the greater likelihood of a sale. As described earlier, used cars are subject to greater information asymmetry and higher prices compared to the products previously studied. Consequently, the reputation effect may be stronger in this study than in previous studies.

This study did not look at the quality of comments in the reputation ratings. Although the type or nature of the negative comments could be important (Weinberg & Davis, 2005), it would be difficult to qualitatively measure each comment or its seriousness given the wide range of complaints. Also, since most sellers have few negative comments, the total feedback score is believed to be more indicative of a reputation gained through longevity. Sellers with numerous complaints are not in business long and, therefore, are most likely not in the sample. In addition, a seller with negative feedback is likely to change identity and resume trading with a new name and a new reputation.

It should be pointed out that the reputation rating was obtained in close proximity to when the auction ended. Since feedback scores are in real time, it is important that the score used in the regression be the score that the bidder observed during the bidding process. As pointed out by Houser and Wooders (2006), the feedback score must be obtained without a lag, because additional feedback after a sale could significantly change the score from that used by the bidder when making his or her bid.

The auction characteristics are as follows: the natural log of the number of pictures, whether the display is professional, whether the auction ends after 5 P.M., and whether the item is a featured item. In the market for relatively high priced heterogeneous products like used cars, the seller's presentation is expected to

significantly affect the price premium received by the seller. The buyer in a used car internet auction does not have the ability to test drive or personally evaluate the automobile. Because of the potential risk, one would expect that product pictures, written description, and the professional appearance of the presentation would play a greater role in a used car auction than in an auction of a relatively inexpensive, homogeneous product. A buyer would hope to reduce risk by purchasing from a seller who makes a clear, unambiguous presentation with adequate pictures, etc. Without a clear, informative presentation, a buyer may bid a lower price relative to value to compensate for the greater risk of information asymmetry. If quality of presentation matters, then previous studies of seller reputation that do not include a variable representing the quality of presentation may overstate the importance of reputation on price.

As shown by McDonald and Slawson (2002), the time at which an auction ends may influence price. In their study, a lower price was more likely to be obtained when the auction ended between midnight and 4 A.M. This study tests whether there is an advantage or disadvantage of ending an auction between 5 P.M. and midnight. We hypothesize that auctions ending in the evening and before bedtime are likely to earn a higher price premium than those that end during the day or after midnight.

Featured items are auctions that appear at the top of the auction list with the heading "featured items." The more prominent placement is designed to attract more potential buyers and bids. Since this eBay option costs $19.95, one would expect a higher final price for items that are sold as featured items.

Although Dewan and Hsu (2004), Horstman and LaCasse (1997) and Walley and Fortin (2005) found that a disclosed reserve price can influence the final price and/or probability of sale, this study does not include a reserve price variable because almost all eBay used car auctions have an undisclosed reserve price. The coefficients of all variables, except dealer, are expected to be positive in all three models. It is unknown whether a dealer is able to secure a higher price premium or more likely to sell a car on eBay than a non-dealer.

Results

As shown in Table 3, for all auctions that received a bid, higher bids were generated by cars with clear title, auctions that ended between 5 P.M. and midnight, and sellers with good reputations. For auctions that ended in a sale, autos with clear title and authorized car dealers were more likely to generate higher price premiums. Reputation also appeared to have a significant effect on whether a car sold or not.

The warranty variable did not have a significant effect on either the probability that a car would sell or on the premium the seller received relative to the Kelly Blue Book value. It appears that eBay's free 1 month, 1,000 mi warranty has no monetary value to buyers. This may occur because buyers attach little value to a free warranty with such limited coverage, especially if there is still a manufacturer warranty in effect.

Clear title was a significant determinant of the price premium for cars that sold and cars with at least one bid. The price premium and highest bid for a car with a

Table 3 Results (p values in parentheses)

Model	1 Auctions with Bids	2 Auctions with Cars that Sold	3 All Auctions (logit model)
Dependent var.	KBBdiffbid	KBBdiffsold	Sold
Independent var.			
Constant	−3102.410*** (0.000)	−1401.92** (0.034)	−1.667** (0.021)
Warranty	−44.279 (0.837)	−132.140 (0.506)	−0.098 (0.654)
Clrtitle	1147.111** (0.030)	1523.899*** (0.000)	−0.515 (0.336)
Dealer	−22.817 (0.936)	682.020*** (0.005)	−0.512* (0.082)
Lnpics	−210.575 (0.194)	−272.504* (0.068)	0.234 (0.172)
Profdisp	−374.230 (0.152)	−247.177 (0.276)	−0.587** (0.029)
Aftfive	431.535** (0.040)	210.781 (0.269)	0.199 (0.350)
Featureitems	173.324 (0.460)	276.158 (0.187)	0.075 (0.757)
Rep	1.043*** (0.006)	−0.170 (0.598)	0.001 (0.125)
Pctrep	8.628** (0.018)	−2.893 (0.590)	0.016*** (0.001)
R^2	0.083	0.166	0.072
N	360	147	437

***Indicates significance at the 99% level, **95% level, and *90% level.

clear title was $1,147 higher than for a car without a clear title. For cars that sold, the difference was even more pronounced. Regression 2 shows that sellers could earn $1,524 more if a car has clear title. Clear title was not significant in determining whether a car sold or not.

Dealers were significantly less likely to sell their vehicles, but earned a significantly higher premium than non-dealers for cars that sold. As shown in regression 2, dealers sold their cars for a price premium of $682 more than non-dealers. The higher price for dealers may occur because dealers establish a higher initial reserve price than non-dealers. As a result, a dealer might sell fewer cars, but when a dealer sells a car it probably sells for a higher price. Buyers may also be willing to bid higher when buying from an authorized dealer rather than an unauthorized individual. In comparison to an individual, an authorized dealer may be perceived as more likely to guarantee satisfaction or more reliable in the resolution of disputes. Dealers are also more likely to provide independent verification of the quality of the interior, exterior, and engine of the car. These factors are separate from the reputation rating based on previous sales although both contribute to the buyer's trust.

Interestingly, the variable related to number of pictures was inversely related to the price premium for cars that sold. According to regression 2, if the log of the number of pictures goes up by one, the premium is reduced by $273. These results conflict with the results obtained by Yin (2003) who found that a professional auction display was positively related to the prices obtained for used computers. Melnik and Alm (2005) had also found that visual scans were positively related to the price of noncertified coins, but not certified coins. They concluded that pictures are more important when the quality of the product is less easily established and that pictures increase the buyer's confidence in the product. In the case of used cars, one would assume that pictures would be relevant to the buyer and help the buyer establish quality, too. But, a more correct assessment of value does not necessarily

cause an increase in price paid. It could actually result in lower bids and a lower final price. A presentation with many pictures could more clearly reveal a product's flaws. This could lead to lower bids and lower final selling price. This does not mean that the price paid is too low. It could mean that the price is appropriate given the condition of the vehicle.

Using a professional display service was associated with a reduced probability of sale and had no significant impact on the seller's premium. These results call into question the advisability of paying a premium for a listing service. As described earlier, CARad (an eBay company) charges a $9.95 fee for its professional listing service.

As shown in regression 1, ending an auction between 5 P.M. and midnight appeared to generate higher bids, but was not associated with more sales or higher premiums on cars that were sold. Since most bidding occurs in the final few minutes of an online auction, an auction that ends when buyers are more likely to be available (i.e., not at work or asleep) may tend to generate more bids and higher bids.

And using the "featured item" option offered no significant advantage despite the associated $19.95 fee. Consequently, placement in an online auction site does not appear to increase price or the likelihood of completing a sale. This variable may be insignificant because buyers are aware that the seller paid a fee for this and that the option is not related to quality. This lack of significance may also occur because buyers are more apt to perform a thorough search through a fairly large number of vehicles before choosing a particular used car. This would make an early position in the list less relevant to a buyer.

Reputation was significantly related to the highest bid in auctions with at least one bid, but the effect was small considering the average high bid. The overall reputation variable (Rep) was associated with higher bids in auctions that had at least one bid, but had no significant impact on the price premium for cars that sold or the probability of a sale. The overall reputation variable was represented by the total feedback score and ranged between −1 and 1,563. As shown in regression 1, one additional positive comment would increase the highest bid by $1.04. Given that the average high bid was $6,360, the reputation effect is very small.

The percentage of positive feedback variable (Pctrep) was positively related to the bid premium and the probability of sale. In this case, a 1 percentage point increase in the percentage of positive to negative comments would increase the highest bid by $8.63. This is also a relatively small dollar effect. The percentage of positive comments versus negative comments influenced the likelihood of sale such that the higher the percentage the more likely the auction would result in a sale.

There are three possible reasons why the reputation effect is so small. First, it may result from a low level of variability in the percentage of favorable feedback variable. Since most sellers have a favorable feedback variable that is close to 100%, the buyer gets relatively little information from that number, and the variable will have relatively little impact in the regression. Second, the two reputation variables used in this study may not be as important as the content of the negative feedback and the counter responses from the seller. Further research might refine the reputation variable to include the content of the negative feedback and whether the

seller responded to the feedback and/or satisfied the complaint. Third, buyers who are aware of the existence of shill bidding (which occurs when the buyer bids on his/her own product) and the existence of fake sales may place less confidence in the accuracy of the reputation rating. They may understand that fake sales generate fake reputation feedback. Buyers, who are aware of this potential problem, may be more likely to purchase a used car based on other factors – like a clear title. Shill bidding and buying may have diluted the reputation rating as an important measure of content.

Conclusion

The results of this study indicate that the seller reputation increases the bid premium in auctions that have at least one bid and probability of sale in online auctions of used cars. The effect, however, appears to be small when compared to the effect of clear title or time that bidding ended. The professional display and the number of pictures do not appear to enhance the price premium or probability of selling a vehicle. We expected the presentation to be a significant variable in this study because the item is heterogeneous, expensive, and difficult to evaluate in an online setting. The results of this study contradict the results obtained by Yin (2003) and Melnik and Alm (2005). More research needs to be done on the importance of presentation in online auctions. To date, relatively little has been done in this area.

One might ask why do sellers continue to pay for features that bring no significant increase in price premium? The decision to use a professional display may be related to eBay's claim that using such a service will increase the seller's price and probability of sale. More study needs to be done to determine the validity of this claim.

A possible explanation for the insignificance of a feature like whether the car has an STS warranty may be related to the inability of the buyer to compare cars based on their features (collecting data to make comparisons of items offered on eBay transactions is best done by eBay itself). Data collection by buyers is more difficult. For example, in this study many characteristics were collected by using the "compare items" feature used in conjunction with the "search completed listings" command. The "compare items" option gives a side-by-side comparison of characteristics of up to 25 items. Each time another 25 items are compared, the order of the characteristics is different making the comparison of a large number of offered items difficult.

In sum, clear title, seller reputation, and when the auction ended had a significant effect on the bid price premium in used car auctions with at least one bid. Clear title and whether the seller is a dealer were associated with positive price premiums for the used cars that sold. Finally, reputation increased the probability of a sale, but professional display actually decreased the probability of a sale. The results are by no means conclusive and leave the door open for more research into online auction behavior. More research needs to be conducted to determine the effect of reputation and presentation on more expensive heterogeneous goods sold through online auctions.

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