

Valuing Information: Evidence from Guitar Auctions on eBay

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One assumption of perfect competition is the existence of complete information in the market. This paper examines the value of information signaling in markets where product and seller quality cannot be observed with certainty.

Akerlof (1970) and others have examined the impact of incomplete information on market outcomes. Akerlof posited that the “lemon problem” may cause low prices to crowd out quality goods in a resale market. The basic result of Akerlof’s work was that when quality can not be observed with certainty, owners of high quality goods will have no incentive to offer these goods for sale as buyers will not offer a sufficiently high price to induce quality goods on the market. Akerlof termed this the lemon problem.

This paper examines the internet-based auctions of high end guitars. In this situation, buyers are not able to gather complete information about either the goods being offered for sale or the sellers offering the goods. Buyers will have some knowledge of the item being offered based upon the reputation of the original product.

The internet based resale of high end guitars is an example of the case in which incomplete information may lead to lower prices in the secondary market. In this type of transaction, a seller has significantly more information on the quality of the instrument offered for sale than does the buyer. In addition, many of the important information items needed to value the guitar are highly subjective in nature. For instance, a guitar may be described as being in “mint” or “excellent” condition, or a “9.5 out of 10.” All of these descriptors are subjective (though one could devise a set of guidelines in order to make such statements more objective). Other critical elements, namely sound and appearance, are highly subjective as well and it would

be difficult to find criteria which would make statements such as “looks great, sounds better” more objective. With the goods under examination in this paper there is knowledge concerning sound and appearance from the manufacturers’ reputations, however information on the particular guitar being auctioned will be incomplete on the buyer’s side.

Dealing on eBay presents another dimension of information uncertainty as well. In addition to uncertainty over the quality of the product, there is uncertainty over the quality of both the seller and buyer in the market. It is understandable that buyers may be nervous about sending cashier’s checks or money orders for large dollar amounts to complete strangers. It is also understandable why sellers are nervous about accepting personal checks from complete strangers, though sellers do have the advantage of holding the goods until they receive payment. Moreover sellers can always offer the good for sale again if the original high bidder does not follow through.

In light of these difficulties, especially with high priced goods, it would make sense that a seller would want to offer some signal of the quality of the instrument and the quality of the seller. This paper will examine how valuable such information signals are in this particular market. The next section will briefly review the empirical literature on auction involving adverse selection and internet-based auctions. The paper will then present a simple theoretical model which will motivate the empirical research which follows.

Previous work on auctions and incomplete information

Related work has been undertaken in the car market by Genesove (1993) who examined adverse selection at used car auctions based on the seller of a car. Some of the factors considered

include whether the car is offered by a new car dealer, if the car had one owner, mileage, and the reported condition of the car. Genesove found mixed evidence for adverse selection through price differences for cars offered by new car dealers and cars offered by used car dealers (who would have some incentive to keep good used cars for themselves).

Genesove (1993) lists four criteria a market must exhibit in order for adverse selection to lead to the lemon problem. First, at the time of the sale, one side of the market has more accurate information concerning the quality of the good. Second both the buyer and seller must value quality. Third, price is determined by the less informed party. Finally, extratrading institutions must not fully eliminate uncertainty over quality.

These criteria are at least weakly met in the type of internet auction under investigation here. Clearly the seller better knows the quality of the instrument being offered for sale. In an auction type of market, the buyer will determine the final sales price, subject to the highest bid meeting the reserve (or minimum acceptable) price. The concern over quality is met by the choice of the guitars to be studied, a high quality, high reputation, and relatively high price brand. In this study auctions of four models of Paul Reed Smith (PRS) guitars are examined. Finally, escrow services have developed which should reduce, but not eliminate, quality uncertainty.

There are information signals available in an online auction which may serve to imperfectly reduce uncertainty, and it is the value of these signals which this paper investigates. The best known signal on eBay is the feedback rating of a buyer or seller. At the conclusion of a transaction both buyers and sellers may rate the other party by leaving “positive”, “neutral”, or “negative” feedback. eBay computes a feedback rating by subtracting the amount of negative feedback from the amount of positive feedback. Only feedback from unique users is

counted in the feedback rating, thus several positive feedbacks from one buyer would have the same impact on the seller's feedback rating as one positive feedback from one buyer.

Other means of reducing uncertainty in the transaction would include the availability of escrow services and fraud protection offered by credit card companies. Finally, a seller may include pictures of the item to be auctioned to eliminate some uncertainty from the transaction. It may be suggested that escrow services and the acceptance of credit cards serve to reduce uncertainty over the quality of the seller, while pictures serve to reduce uncertainty over the quality of the product offered for sale. It is still reasonable to expect that uncertainty exists over quality in the final trade.

There is a growing literature on internet auctions. Katkar and Lucking-Reiley (2001) examine whether a high secret reserve price deters bidding and thus reduces the likelihood of sale and the final bid amount. To do this they auction matched pairs of Pokemon trading cards: offering one with a low starting bid and a higher secret reserve price, and the other with no reserve and a higher starting bid. They find that establishing a higher minimum bid is a preferred seller strategy to having a trivial opening bid with a higher secret reserve price. This paper did not address the issue of reputation in auction sales (indeed the authors attempted to prevent buyers from posting feedback until the auction was complete). The maximum value on the cards auctioned was \$25.00 with median card values of \$6.

Lucking-Reiley et.al (2000) , Melnik and Alm (2000), and Houser and Wooders (2000) all examine the impact of reputation on final prices in eBay auctions. These papers typically find that reputation matters, but not alot. For example, in a study of auctions of U.S. pennies, Lucking-Reiley et. al. find that a one percent increase in a bidder's positive feedback leads to a

0.03% increase in the final bid price while a 1% increase in negative feedback leads to a 0.11% decrease in the final bid price. The mean book value of the items in this data was \$278 with a mean bid price of \$173.

Melnik and Alm study auctions of 1999 \$5 U.S. gold coin in mint condition. The average price of the coins in their auction was \$32.73. Houser and Wooders examine auctions of Intel Pentium III 500 Mhz processors during the fall of 1999. By selecting a reasonably homogeneous good, the authors hope to more clearly isolate the impact of the seller's reputation on the bid. The mean price of the chips offered for auction was \$220. The authors find that a 10 percent increase in negative feedback lowers the bid price by .24 percent. Although this finding is statistically significant, it is of very small magnitude.

This paper will examine auctions of merchandise with much greater bid prices where it might be expected that reputations matter more, given the large sums of money involved. In addition, the quality of goods examined in this paper is difficult to measure objectively and thus information signals should matter. Finally, this paper adds to the literature by examining heterogeneous goods where information about the quality of the particular item is incomplete.

Theory

The classic lemons problem can be understood as following.¹ In a market, a consumer has the choice of purchasing a new guitar or a used guitar. For this case we assume that a new guitar is of high quality with probability one. A used guitar will be of uncertain quality due in large part to wear and tear and the care given the instrument by the previous owner. We can also

¹ The following discussion draws heavily on the exposition of the lemon problem in Shy (1995).

understand that certain subjective aspects of the instrument (such as sound and appearance) can not be known with certainty for the used instrument. In the case of the new instrument, we will assume that the buyer will have first hand knowledge of the instrument.

Assume the following:

N^G is the value of a new, good guitar, which occurs with probability α .
 N^B is the value of a new, bad guitar which occurs with probability $1-\alpha$.
 U^G is the value of a used, good guitar which occurs with probability β .
 U^B is the value of a used, bad guitar which occurs with probability $1-\beta$.

$EN = \alpha(N^G) + (1-\alpha)(N^B)$ the expected value of a new guitar.
 $EU = \beta(U^G) + (1-\beta)(U^B)$ the expected value of a used guitar.

For simplicity, we set $\alpha = 1$ and $N^B = U^B = 0$. Further, let p^N and p^U represent the prices of new and used guitars, respectively. There is no reason *a priori* to expect that the value of a new guitar and the value of a used guitar should be different. Indeed for certain instruments the value of the old guitar will be higher than that of a new model.²

A buyer will be indifferent between the purchase of a new guitar and a used guitar provided that:

$$EU - p^U = EN - p^N .$$

Rearranging we have:

$$p^U = EU - (EN - p^N) .$$

²There is an active market in the resale of guitars and numerous shops which specialize in used instruments. This could be incorporated into the theory by suggesting that “new guitar” be replaced with a guitar which the buyer has examined personally. In this case much of the uncertainty surrounding both the objective and the subjective quality of the guitar is eliminated.

Or:

$$p^U = \beta(U^G) - (N^G - p^N) .$$

This demonstrates that the price of a used guitar will increase as β , the likelihood of a good, used guitar, increases. Thus, the more accurately a buyer is able to discern the quality of a used guitar, the higher the price for the used guitar should be. In an internet auction, where the buyer is not able to examine the instrument in person, it can be expected that $\beta < 1$. In order to raise the price of the used guitars it might be expected that sellers would take actions which would increase the certainty of buyers regarding the quality of the guitar, β . It can also be suggested that in an auction setting, uncertainty over the quality of the seller should reduce β .

Methodology:

The products to be examined in this paper are electric guitars manufactured by Paul Reed Smith (PRS) guitars. PRS produces high-end guitars with list prices, and often resale prices, starting well over \$1,000. PRS guitars have been in high demand over the last few years and have an active resale presence on eBay.

eBay offers several methods of reducing uncertainty in an auction transaction. The most notable is that of the feedback rating where the parties to the transaction may rate each other. This becomes part of a feedback file. Some sellers refuse to accept bids from potential buyers with negative or zero feedback. One would also expect that sellers with negative feedback ratings, or a high percentage of negative feedback ratings, would have a harder time selling an instrument.³

³eBay offers buyers and sellers the chance to read the comments submitted by previous

To reduce uncertainty concerning the condition of an instrument, a seller can post pictures of an item offered for sale. It is expected that auctions which provide pictures would attract more bidding action than auctions that do not have pictures.⁴

To reduce uncertainty concerning the security of the financial transaction, one would expect that a seller's willingness and ability to take credit cards would reduce buyer uncertainty as the credit card company would provide an additional means of recourse against a poor quality seller. Finally, a number of e-escrow services have developed in which a third party collects money from the buyer prior to their receipt of the good and holds the money until the buyer indicates satisfaction with the transaction. One should expect that a lower risk of fraud in a transaction would increase the number of bids as well as the selling price for an auctioned item.

The paper estimates equations for 1) the likelihood of an item selling (using a logit model) and 2) the amount of the high bid (regardless of whether a sale was made). It is hoped that this paper will shed light on how valuable information signals are in this particular market.

Data:

The data for this paper comes from auctions completed on eBay between January and April of 2001. Data were collected by hand on several relevant variables including the model of

trading partners and thus this may mitigate an occasional instance of negative feedback.

⁴This may be especially true for PRS guitars as they are prized for their appearance as well as their sound.

the guitar, measures of information provided, whether a sale was made, the number of bids and the final bid price. This section will describe the data in more detail.

The first left hand side variable in this analysis is a binary variable indicating whether a particular auction ended in a sale.⁵ A second set of models will be estimated for the high bid at the end of an auction. The high bid will be estimated regardless of whether an auction ended with a sale, but will only include auctions for which at least one bid was registered.

To control for the different models of guitar available for sale, dummy variables will be used to indicate broad category classes. These dummies will also serve as a proxy for the book value of an instrument. Lucking-Reiley et. al. suggest that excluding the value of a good will lead to omitted variables bias. For PRS guitars, four model classes will be used: McCarty, CE, Singlecut and Custom. Between the four categories, data from 361 auctions is used to estimate the “goods sold” model while data from 325 auctions is included in the high-bid model.

Analysis variables include measures of product information and seller reliability. For a measure of product information a series of variables indicating whether pictures of the guitar were included in the posting of an item for sale. Separate models use a dummy variable for including a picture as well as the number of pictures. Because of the subjective nature of appearance, it would be expected that a buyer would increase their expected probability of a

⁵ Whether an auction ends in a sale depends in large part on the reserve (or minimum sale) price set by the seller. Thus, it is possible that the high bid for an auction may closely reflect the market valuation of an instrument, but a higher reserve may prevent a sale. Many sellers begin the auction with a non-trivial opening bid, thus at least one bid must have been offered on the good in order for the final high bid to reflect auction activity.

satisfactory purchase with some (albeit imperfect) visual information and thus these variables should have a positive impact on the dependent variables. This should be particularly true for PRS guitars which are valued as much for their appearance as their sound.

The second primary issue of analysis regards assurance that the transaction will be completed once money is exchanged. Many sellers are wary of accepting personal checks and require either a money order or cashier's check. A buyer might be reasonably hesitant to send a large sum of money to a complete stranger in advance of receiving merchandise. eBay offers a mechanism for previous traders to leave feedback on the quality of the seller (and the buyer). While not a perfect signal, it may be reasonable to assume that sellers with high numbers of feedback (and, in particular, high positive feedback) would be more likely to receive high bids on their products. This will be measured by the amount of feedback for a seller and the proportion of positive feedback. Measures of negative feedback will also be included, as well as interaction terms to identify changes in slope and intercept terms for those sellers with negative feedback.

Secondly, some sellers are willing to take credit cards for purchases and it could be expected that buyers would feel more secure with these sellers as most credit cards offer fraud protection. A dummy variable will measure whether credit cards are accepted. In addition, the ability to take credit cards may indicate that a seller is a business as opposed to an individual which may also reduce the uncertainty of the buyer.

Finally, several escrow services are now available for eBay auctions. A dummy variable will be used to signal whether escrow services are available. In this type of arrangement, payment is sent to a third party and is only released to the seller when the buyer has received a satisfactory product.

There are several factors in the market which may serve to mitigate any information problems. Primary to this paper is the quality of the product being offered. PRS guitars are built to very high quality specifications, and the instruments are very consistent in terms of quality. It is in fact not rare for buyers in the new guitar market to order these guitars from distant stores by phone or over the internet. While reputable stores allow a buyer to return a guitar if they are unsatisfied, there is a shipping cost involved. The known quality of the new instrument may reduce the information asymmetry in the used market.

In addition, the nature of the eBay market may lead those who a) have limited information about the product in general or b) are risk averse to avoid searching for an instrument on eBay. In this case the self-selection of eBay participants may reduce potential lemon problems. Resnick and Zeckhauser (2001) suggest that those who are likely to be poor sellers are similarly deterred from participating in the market.

Table one presents summary statistics for Paul Reed Smith guitars. Panel A provides descriptive statistics on the entire data set, while panel B separates the data by feedback levels used in the high bid estimation.

Results:

Table two reports results of logit estimations for the dependent variable which takes a value of '1' if the auction for a PRS guitar ended with a sale. Column 1 presents the results for a basic logit model which contains only information items as independent variables. While three of the right hand side variables are statistically significant, two, presence of a picture and the willingness to take credit, have signs that are opposite of those hypothesized. The second

column includes dummy variables for various models of guitars and suggests that auctions for CE and Custom models are significantly more likely to end in a sale than auctions which involve a Singlecut model. The statistical significance of information variables is reduced in this estimation, while the signs for credit cards and pictures are still opposite of that hypothesized.

Column three introduces measures of negative feedback using both an intercept dummy as well as slope interaction terms. The dummy variable for negative feedback has a negative sign and a p-value of .116, just above standard measures of statistical significance. While the dummy variable for the presence of a picture has a negative sign, for those with negative feedback, the presence of a picture increases the probability of an auction ending with a sale. The availability of escrow is statistically insignificant for those with no negative feedback, but the slope interaction term is positive with a p-value of .129.

As will be further discussed later in the paper, it may be suggested that separate models are appropriate for those with different amounts of feedback. Separate models were estimated for those with feedback ratings less than 20, (column 4) and those with feedback ratings of at least 20 (column 5).⁶ The presence of negative feedback significantly reduces the likelihood of a sale for those with feedback ratings of at least 20 while the interaction terms for negative feedback with the presence of a picture and the availability of escrow services are positive and significant. For those with low feedback ratings, only the availability of an escrow service significantly affects the probability of a sale.

⁶ A feedback threshold of 20 was used as this provided stability to both parts of the separate model.

Some of these results can be explained by the nature of the auction market. In many cases, the seller places a “reserve” price below which they will not complete a transaction. One may expect that credit cards are more likely to be accepted by businesses and, as a result, businesses selling items may set a higher reserve for items than individuals. Indeed, it is not infrequent that one sees a reserve or “buy it now” price above that at which certain dealers sell new instruments.⁷ Thus, the fact that a seller accepts credit cards may also indicate that a higher reserve price may be set.

This may also be the case with PRS guitars and pictures. As previously mentioned, PRS guitars are prized for their appearance as well as their sound. As a result, a seller may use pictures to attempt to induce buyers to meet a higher reserve price.

These results also suggest that information items are valuable for sellers with negative feedback. Sellers with negative feedback increase their likelihood of sale by including pictures and escrow services. This is particularly true for high feedback sellers.

eBay records the high bid for each auction, as well as whether an auction ended in a sale. The next set of tables report the results of estimation for the final bid for an auction. Auctions with zero bids (where the high bid would be reported as the seller’s starting bid) were not included in this estimation. The data set contained 325 observations. These models were estimated using White’s correction for heteroskedasticity.

Table three presents the results of four models estimating linear regressions for high final

⁷ Buy it now allows buyers to pre-maturely end the auction by offering a pre-disclosed amount to the seller. Once the reserve price is met, the buy it now option disappears.

bids for PRS guitars. Column one presents the results of a simple model including only information variables. The dummy variable for pictures and the dummy for credit card are both statistically significant and have positive impacts on the high bid. Although a picture may not be worth a thousand words, column 1 indicates that the presence of a picture adds \$232 to the high bid. Although the dummy variable for escrow and the variable for the amount of feedback both possess negative coefficients, neither is statistically significant. The adjusted R-square is troubling with only 1 percent of the variation in bids being explained by the explanatory variables. In addition an F-test cannot reject the null hypothesis that all the right hand side variables are jointly insignificant.

Column two introduces dummy variables for different models of guitars. Each of these dummy variables is statistically significant and possess a negative sign (which is to be expected given that the Singlecut is the benchmark model). The dummy variable for pictures is positive and statistically significant and indicates that a picture adds \$183 to the high bid. Other information items are not statistically significant. An F-test cannot reject a null hypothesis of joint insignificance of all the information variables.

Columns three and four use the number of pictures as explanatory variables, with column four introducing a squared term. In column three, the number of pictures is the only significant information variable and suggests that each picture adds \$60 to the final bid. The adjusted R-squared increases with each column of the table. An F-test cannot reject the null hypothesis that information items other than the number of pictures are jointly insignificant for the model in column three. Column four incorporates the square of pictures which is statistically insignificant though positive.

The estimates reported in table three would seem to indicate that information items, with the exception of the number of pictures, have no impact on the final bid price. Interestingly, feedback has no impact in any of the models.

Separate models were estimated which also included measures of negative feedback. These are reported in table four. Column one of table four includes a dummy variable for the presence of any negative feedback. Column two adds slope interaction terms with the other information variables. In the results from column one, the presence of negative feedback is statistically significant, but enters with a non-trivial positive sign indicating that the presence of negative feedback increases the high bid by \$504. This is clearly counter to what is hypothesized. To further understand this result, interaction terms with other information variables were added. These results suggest that for those with negative feedback increasing the number of pictures can further increase the high bid price. The positive sign on the dummy variable for negative feedback remains, though this dummy variable is no longer statistically significant. The interaction term between negative feedback and escrow is negative though insignificant, suggesting that for those with negative feedback the availability of an escrow service may provide a negative signal. The interaction term for negative feedback and credit is negative and insignificant. Pictures do appear to offer valuable information, particularly for those with negative feedback.

These results make sense in the context of the model if the source of negative feedback, or the source of uncertainty, relates to the product as opposed to the seller. Additional pictures should increase the buyer's confidence in the item to be purchased. If the source of the negative feedback relates to the quality of the seller, additional pictures would not diminish the

uncertainty in the transaction. Escrow services tend to relate more to the quality of the seller than the product and thus the negative sign does seem reasonable.

One concern related to the impact of negative feedback is the possibility that those with negative feedback tend to be those with more eBay transactions and thus the negative feedback is acting as a proxy for more experienced sellers.⁸ To test this a Chow Breakpoint test was used to discover statistically significant breaks in the data at feedback levels of 40 and 100.⁹ Results of estimations based on three sub-samples of the data are reported in columns three (feedback rating of 40 or below), four (feedback rating of 40 to under 100) and five (feedback greater than 100).

For those with feedback ratings under 40, none of the information items, including the number of pictures, are statistically significant. For those with feedback ratings between 40 and 100 the sign of the dummy variable for escrow is positive with a p-value of .13. Of interest is the fact that the interaction variable is large and negative between the presence of negative feedback and having an escrow service available. Again, there are indications that the escrow service may send a negative signal about the quality of the seller, particularly if the seller has negative feedback. The number of pictures is statistically insignificant, however the interaction term between negative feedback and the number of pictures is positive and statistically significant.

Column five reports estimation results for those with feedback ratings of more than 100.

⁸Indeed a simple regression of negative feedback on number of feedback yields a statistically significant relationship which predicts a one unit increase in negative feedback for each 60 unit increase in overall feedback.

⁹ The Chow breakpoint test is used to test the hypothesis that the regression coefficients between two (or more) subsets of the sample are the same as opposed to the alternative hypothesis that the coefficients are different across different subsets of the sample. See Greene (2000), page 287-292.

Of further interest is the fact that none of the interaction terms are significant. The number of pictures does have the expected sign. For this group of sellers, just shy of 50 percent had at least one negative feedback, and while the dummy variable on negative feedback has a large value, it is statistically insignificant.

An examination of the descriptive statistics for the various groups, (table one, panel b), also illustrates the differences among the different groups of sellers, particularly in regards to the information variables. While it is true that the proportion of sellers with negative feedback increases as we move through the three groups of sellers, it is also true that the percentage of negative feedback falls. For the group with feedback ratings of less than 40, 8 percent have at least one negative feedback, and on average 1.2 percent of the feedback received by this group is negative. In contrast, among sellers with a feedback rating of at least 100, 52.2 percent have at least one negative feedback, but on average only 53 percent of feedback is negative. It should be pointed out that the proportion of goods sold is highest for the group with feedback ratings of less than 40, which may also lend credence to the suggestion that very experienced sellers hold out for higher reserve prices.

Table five reports results for the same models as in table four with the exception that the number of pictures is replaced with a dummy variable for including a picture. For the most part the results are qualitatively similar, though column four does change somewhat. Now, the dummy for pictures is statistically significant with a large coefficient and the interaction term between negative feedback and accepting credit cards is negative and significant, again with a large coefficient. Adjusted R^2 measures suggest that the specification in table five is preferable for all but those with feedback over 100.

Conclusion:

This paper has estimated the impact of various information related items on the probability of sale and the high bid price for Paul Reed Smith guitars on eBay. This paper is distinct from others which have examined eBay auctions due to the use of high ticket items which encompass both visual and aural subjectivity which may increase the value of information-related items.

The results indicate that some information items, such as pictures, do, in fact, convey valuable information. This paper has also found that the use of escrow services may actually send a negative signal to prospective buyers. This is particularly true if a seller has negative feedback.

Negative feedback is only statistically significant when measured by a dummy variable. Of interest is the finding that the presence of negative feedback increases the final bid price, *ceteris paribus*. This result disappeared when interaction terms with other information variables were added.

One can think of reasons why negative feedback in this market may not have the expected negative impact on high bid, while having a negative impact on the likelihood of a sale. There are at least two possible explanations for this seemingly contradictory result. The first is the possibility that negative feedback is more likely to occur for those who are active traders on eBay, and thus the presence of negative feedback may not be an immediate cause for alarm. The use of the Chow Breakpoint test seemed to suggest that this was the case. In addition, negative feedback was common for those who were active traders. The decreased likelihood of a sale may

reflect more on higher reserve prices for eBay “pros” than a lack of trust in the seller.

The second possibility is that negative feedback may encourage communication between buyers and sellers prior to a bid. For instance, if I am considering bidding on a guitar and notice that the seller has negative feedback, it is possible for me to find the negative comments (and any response) in the seller’s feedback file. A potential buyer may also examine the feedback file of the one posting the negative feedback to assess the credibility of the one posting the negative feedback. If the complaint revolved around an issue of information concerning the guitar, a potential bidder could e-mail the seller and have complaints addressed in this manner. Thus it is possible that increased communication may lead to higher bid prices. Evidence for this is the positive impact of the interaction term between pictures and negative feedback.

It may also be suggested that the market examined mitigates the information problem. As previously mentioned, PRS guitars are known for high quality and consistent tonal properties. As a result, the amount of incomplete information in the market may be small, and thus the impact of the information variables may not be large.

There is much room for further work on information signals and auction behavior. Of interest is the extent to which negative feedback related to seller characteristics affects auction outcomes differently than negative feedback related to product characteristics. Additionally, there are functional form issues in the estimation of auction prices which may also provide fruitful avenues of further study.

Table 1: Summary Statistics, PRS guitars.

A. General Descriptive Statistics, n=361.

	High Bid	Credit Card (dummy)	Escrow (dummy)	Feedback (number)	Negative Feedback (dummy)	Negative Feedback (number)	Number of bids	Picture (dummy)
Mean	\$1,620.93	0.4820	0.4210	106.62	0.1717	0.5734	10.2	0.9086
Std. Dev.	\$706.60	0.5004	0.4944	253.05	0.3777	1.84	7.81	0.2886
Median	\$1,525	0.0000	0.0000	28.00		0.00	9.00	
Max.	\$7,110			2,030		16	36.00	
Min	\$200			0		0	0	

Table 1, continued.

B. Descriptive Statistics by Feedback Level

Includes 325 observations used in the estimation of high bid.

	Feedback ≤40			40< Feedback ≤ 100			Feedback >100		
	Feedback	Negative Feedback	Percent with negative feedback	Feedback	Negative Feedback	Percent with negative feedback	Feedback	Negative Feedback	Percent with Negative Feedback
Mean	12.41	0.15	0.08	58.35	0.16	0.11	410.12	2.18	0.52
Median	9.00	0.00		55.00	0.00		216.00	1.00	
Max	40.00	3.00		97.00	3.00		2,030.00	16.00	
Min	0.00	0.00		42.000	0.00		102.00	0.00	
n	173			83			69		

Table 2: Results on Logit Model for “Good Sold”, PRS guitars:
T-statistics in parentheses.

Variable	(1)	(2)	(3)	(4)	(5)
Picture (dummy)	-0.7349** (-1.96)	-0.6524* (-1.72)	-1.088*** (-2.42)	-0.334 (-0.45)	-1.703*** (-2.82)
Credit Card (dummy)	-0.5407** (-2.03)	-0.4894* (-1.78)	-0.465 (-1.57)	-0.480 (-0.97)	-0.076 (-0.18)
Escrow (dummy)	0.5736** (2.20)	0.4466* (1.66)	0.255 (0.87)	1.285*** (2.65)	-0.409 (-0.96)
Feedback	-0.0006 (-1.04)	-0.0006 (-1.09)	-0.001* (1.65)	-0.035 (-1.14)	-0.001 (-0.90)
Negative			-1.357 (1.57)	-0.3041 (-0.21)	-1.93* (-1.75)
CE		1.2634** (2.06)	1.169* (1.89)	1.362 (1.52)	0.767 (0.83)
Custom		1.0984* (1.93)	1.068* (1.85)	1.639* (1.88)	0.719 (0.89)
McCarty		0.4931 (0.82)	0.399 (0.66)	0.220 (0.24)	0.540 (0.63)
Negative*Picture			1.837* (1.88)	2.271 (1.12)	2.108* (1.80)
Negative*Escrow			1.214 (1.52)	32.37 (0.00)	1.718* (1.93)
Negative*Credit			-0.626 (-0.74)	0.011 (0.00)	-0.753 (-0.80)
Constant	-0.0409 (-0.11)	-0.9936 (-1.52)	-0.510 (-0.73)	-1.340 (-1.25)	0.167 (0.17)
Mean of Dependent Variable	0.3186			0.3742	0.2767
Log-likelihood	-219.625	-214.986	-210.61	-84.849	-112.73

Table 3: Results for estimation of high bid, PRS guitars.
T-statistics in parentheses.

Variable	(1)	(2)	(3)	(4)
Credit Card	148.43* (1.73)	44.79 (0.59)	-56.36 (-0.60)	-63.14 (-0.68)
Escrow	-135.21* (-1.74)	-63.88 (-0.94)	- 15.01 (-0.25)	9.63 (0.15)
Feedback	-0.0558 (-0.38)	0.2008 (1.59)	0.15 (1.46)	0.13 (1.27)
Picture (dummy)	231.79** (2.26)	183.38** (2.01)		
Picture (number)			59.70*** (3.34)	4.48 (0.12)
Picture square				4.60 (1.37)
CE		-1,233.87*** (-8.53)	-1,094.86*** (-7.07)	-1,092.48*** (-6.91)
Custom		- 530.19*** (-3.46)	- 470.28*** (-2.93)	- 476.56*** (-2.95)
McCarty		- 588.14*** (-3.50)	- 498.82*** (-2.85)	- 485.06*** (3.71)
Constant	1,424.93*** (16.66)	2,084.35*** (13.12)	1,934.22*** (10.99)	2,033.65*** (12.18)
adjusted R-squared	0.0102	0.1860	0.2391	0.2460
Prob(F-statistic)	0.1217			

Table 4: Results for High Bid for PRS Guitars, including measures of negative feedback. Pictures measured by number of pictures. T-statistics in parentheses.

Coefficient	(1)	(2)	(3)	(4)	(5)
Constant	1,865.29*** (12.17)	1,926.59*** (12.80)	2,059.42*** (9.38)	1,682.54*** (6.41)	1,512.75*** (4.73)
Credit (dummy)	-69.46 (-0.75)	-4.95 (-0.06)	78.86 (0.90)	-16.36 (-0.16)	-501.86 (-1.16)
Escrow	-7.77 (-0.13)	11.83 (0.21)	-7.35 (-0.10)	166.21 (1.48)	-102.74 (-0.59)
Feedback	-0.18 (-1.44)	0.09 (0.45)	3.14 (0.91)	3.50 (0.99)	0.47 (1.49)
Number of Pictures	66.09*** (3.57)	40.70** (2.22)	11.25 (0.68)	20.46 (1.50)	119.99*** (3.03)
CE	-1,140.09*** (-8.40)	-1,117.84*** (-8.74)	-1,131.78*** (-4.7)	-1,203.84*** (-7.14)	-996.60*** (-4.60)
Custom	-497.56*** (-3.60)	-488.03*** (-3.75)	-476.35** (-2.02)	-557.94*** (-4.10)	-98.15 (-0.38)
McCarty	-508.40*** (-3.36)	-499.52*** (-3.48)	-547.81** (-2.21)	-589.83*** (-3.10)	-190.25 (-0.62)
Negative (dummy)	504.34*** (2.88)	229.32 (1.12)	31.42 (0.11)	349.45 (1.16)	612.33 (0.88)
Negative * Credit		-367.99 (-0.99)	743.29 (1.26)	-239.60 (-1.13)	-577.38 (-0.72)
Negative * Escrow		-380.30 (-1.33)	-306.01 (-0.88)	-696.21** (-2.56)	-329.55 (-0.69)
Negative * Number of Pictures		139.45** (2.12)	49.67 (0.57)	194.47*** (5.29)	76.66 (0.96)
adj. R-squared	0.2977	0.3490	0.2877	0.6218	0.3822

Table 5: Results for High Bid for PRS Guitars, including measures of negative feedback. Pictures measured as dummy variable. T-statistics in parentheses.

Coefficient	(1)	(2)	(3)	(4)	(5)
Constant	1,997.50*** (12.95)	2,152.62*** (14.40)	2,159.87*** (9.96)	1,565.15*** (6.31)	2,091.45*** (3.84)
Credit (dummy)	38.44 (0.51)	76.19 (1.20)	110.51 (1.56)	14.44 (0.15)	-390.55 (-0.61)
Escrow	-63.02 (-0.93)	-31.77 (-0.52)	-16.16 (-0.21)	129.49 (1.14)	-125.90 (-0.58)
Feedback	-0.10 (-0.71)	0.14 (0.66)	0.94 (0.28)	2.59 (0.75)	0.55 (1.39)
Pictures (dummy)	253.97** (2.20)	2.06 (0.02)	-80.64 (-0.70)	267.53** (2.38)	517.43 (0.90)
CE	-1,286.81*** (-9.59)	-1,260.92*** (-9.96)	-1,106.15*** (-5.03)	-1,108.53*** (-7.19)	-1,599.89*** (-5.23)
Custom	-559.01*** (-4.10)	-509.83*** (-3.82)	-433.38** (-1.98)	-530.83*** (-3.75)	-295.28 (-0.85)
McCarty	-605.22*** (-4.08)	-579.51*** (-4.04)	-498.60** (-2.16)	-600.35*** (-3.25)	-103.66** (-2.03)
Negative (dummy)	473.62*** (2.62)	-71.79 (-0.39)	-498.21*** (3.30)	213.16 (1.35)	110.81 (0.16)
Negative * Credit		-490.71 (-1.25)	628.93 (1.06)	-687.90*** (-5.41)	-1,197.80 (-1.08)
Negative * Escrow		-287.72 (-0.99)	-420.42 (-1.34)	-1,585.81*** (-5.41)	-4.62 (-0.01)
Negative *Picture (Dummy)		1,083.79*** (2.73)	916.91*** (2.86)	1,992.21*** (6.40)	1,139.78 (1.24)
adj. R-squared	0.2370	0.2780	0.3125	0.6517	0.2181

References

- Akerlof, George A. (1970). "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism." *Quarterly Journal of Economics* 84(3): 488-500.
- Genesove, David. (1993). "Adverse Selection in the Wholesale Used Car Market." *Journal of Political Economy*, 101(4): 644-665.
- Greene, William H. (2000). *Econometric Analysis, fourth edition*. Upper Saddle River: Prentice Hall.
- Houser, Daniel and John Wooders. (2000) "Reputation in Auctions: Theory, and Evidence from eBay." University of Arizona working paper.
- Katkar, Rama and David Lucking-Reiley. (2001). "Public Versus Secret Reserve Prices in Ebay Auctions: Results from a Pokemon Field Experiment." NBER Working Paper, 8183.
- Lucking-Reiley, David, Doug Bryan, and Daniel Reeves. (2000) "Pennies from eBay: The Determinants of Price in Online Auctions." Vanderbilt University working paper.
- Melnik, Mikhail I. And James Alm. (2000) "Does a Seller's eCommerce Reputation Matter?" Forthcoming, *Journal of Industrial Economics*.
- Resnick, Paul and Richard Zeckhauser. (2001). "Trust Among Strangers in Internet Transactions: Empirical Analysis of eBay's Reputation System." Paper prepared for NBER workshop.
- Shy, Oz. (1995). *Industrial Organization: Theory and Applications*. Cambridge: MIT Press.