WINNER'S CURSE OR ADVERSE SELECTION IN ONLINE AUCTIONS: THE ROLE OF QUALITY UNCERTAINTY AND INFORMATION DISCLOSURE

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ABSTRACT

The literature has shown empirical evidence for both the winner's curse and adverse selection in online auctions. Some researchers identify a higher online auction price than the offline/e-tailing market price for the same item, whereas others indicate the opposite. This remarkable inconsistency certainly demands further investigation. By using a controlled field experiment on a popular online auction site, this study was able to directly compare prices between online auctions and e-tailers. The experimental results indicate that both the winner's curse and adverse selection exist in online auctions. The extent to which either occurs depends on the level of online bidders' quality uncertainty about the auction item. This study also examined the role of information disclosure in determining the auction price. The results show that a cheap talk signal does not influence the price, while picture posting only affects price under a high level of quality uncertainty when there is no cheap talk signal. Implications and future research directions are discussed.

Keywords: online auctions, winner's curse, adverse selection, quality uncertainty, information disclosure, cheap talk

1. Introduction

Traditional auction theories suggest that when bidders are uncertain about the true value of an auction item and have to estimate it (i.e., a common value auction), the winner who is the one with the highest estimate often pays a price that is more than what the item is worth (i.e., the winner's curse). Empirical studies have demonstrated the presence of the winner's curse in online auctions by reporting that online auction prices are higher than their offline/e-tailing market prices [Amyx and Luehlfing 2006; Mehta and Lee 1999; Oh 2002].

In a market such as online auctions where buyers have difficulty assessing the product quality, however, it is likely that low quality products drive the high quality products out of the market because the high quality products cannot command a higher price [Akerlof 1970]. This often implies an adverse selection problem wherein buyers are reluctant to pay a high price due to their uncertainty about the product quality. Previous studies have also shown that online auction prices are lower than their offline/e-tailing market prices [Dewan and Hsu 2004; Huston and Spencer 2002].

In order to clarify the mixed empirical findings in the literature, the present study further investigated the existence of the winner's curse and/or adverse selection in online auctions. Most often, previous studies collected

secondary data directly from online auction websites. One problem of this type of observational research, however, is the lack of control over potential confounding factors (e.g., different auction designs and differences among sellers). To avoid this problem, this study conducted a controlled field experiment on a popular online auction site. The experimental setting allowed us to combine the controls of laboratory experiments with the external validity of examining bidding behavior in a real marketplace.

The purpose of this study was twofold. First, this study compared prices between online auctions and e-retailers using a field experiment. Second, this study examined how different factors (i.e., quality uncertainty and information disclosure about auction items) might influence the existence of the winner's curse and adverse selection.

2. Literature Review
2.1. Auction Models
There are two general auction models of how bidders value an auction item: the Private Value Model and the Common Value Model [MacAfee and McMillan 1987; Milgrom and Weber 1982].

In a private value auction, each bidder knows exactly the value of the item and any bidder's valuation of the item is statistically independent from other bidders' valuations. For example, bidders often bid on computers for their personal consumption, thereby they know exactly how much they would like to pay for a computer and their valuations are also not likely to be influenced by how others bid (i.e., competitors' information).

In a common value auction, the auction item has an objective or true value which is the same to all bidders, but nobody knows it and all bidders have to guess the true value of the item, depending on the information they obtain regarding the item. For example, if bidders bid on an antique book as an investment, the true value of this item (i.e., the resale price) may be the same to all bidders, but bidders may have different estimates of that value depending on how much information they have about the item. As a result, bidders may change their valuations during the auction after they observe how their competitors bid.

In online auctions, since bidders cannot directly inspect the auction item due to the physical separation between sellers and buyers, bidders often need to assess the true condition of the item as well as the trustworthiness of sellers' claims. As a result, all online auctions tend to have a common-value component [Bajari and Hortacsu 2004].
2.2. The Winner's Curse
The winner's curse problem is often traditionally associated with the common value auction [Capen et al. 1971; Kagel and Levin 1986]. The winner's curse describes the following scenario: all bidders form their estimates of an auction object based on the information about the object they have. The bidder with the highest estimate is the one who makes the most optimistic estimation of such object, and it is possible that judgmental failures exist among these bidders. Therefore, the winner with the highest estimate may eventually pay a greater price than what the item is worth.

The typical example of the winner's curse is provided by Paul Klemperer, who auctioned off a jar containing an unknown number of pennies to his students. Though the students tended to bid a little below their estimates of the number of pennies in the jar in order to obtain a profit, the winner was still the student who had the most optimistic estimate, thus overpaid by the most.

In empirical studies of traditional auctions, the winner's curse is often measured as the gap between the winning bid and the winner's expected value conditional on winning [Cox and Isaac 1984]. For example, in the first-price auctions (i.e., the winner pays the actual amount s/he bids), Kagel and Levin [1986] found that inexperienced bidders tended to overbid, often leading to the winner's curse; Cox et al. [2001] further indicated that such extent decreased for experienced bidders because of bidder exits and bid adjustments driven by learning. In the English auctions (i.e., ascending-price auctions), inexperienced bidders have also been shown to suffer from the winner's curse [Kagel 1995].

There are two additional reasons why the winner's curse may exist in online auctions. First, potential buyers may underestimate sellers' fraudulent behavior in online auctions [Chua et al. 2007; Gavish and Tucci 2008; Nikitkov and Bay 2008]. For example, Jin and Kato [2002] investigated auctions of baseball cards on eBay. They reported that 11 percent of online sellers misrepresented their items, whereas that number decreased to 3.2 percent in the offline markets. Second, bidding wars may occur sometimes due to auction fever wherein bidders become "caught up" by the competitive nature of auctions and bid more than the items' true valuations [Heyman et al. 2004; Ku et al. 2005, 2006].

The literature has shown two methods of testing the existence of the winner's curse in online auctions. The first method is a direct comparison between online auctions and other marketplaces [Massad and Tucker 2000; Mehta and Lee 1999; Oh 2002]. For example, Massad and Tucker [2000] compared prices of collectible plates and figurines between online and in-person auctions. Their empirical results showed that the average price in live auctions was \$64.33, whereas the average price in online auctions was \$91.87. Oh [2002] also reported that 60

percent of consumer-to-consumer online bidders paid more than the minimal prices observed from 12 online fixed-price vendors. Mehta and Lee [1999] concluded that the winner's curse is especially prevalent when bidders are less experienced and lack information about the auction item in online auctions.

The second method is to examine whether and how bidders adjust their bids so as to account for the winner's curse problem. A number of studies have shown that bidders are aware of the winner's curse and adjust their bidding behavior accordingly [Bajari and Hortacsu 2003; Yin 2005]. For example, Bajari and Hortacsu [2003] reported that eBay bidders bid 10 percent less than their valuations to account for the winner's curse in their sample of collectible coin auctions.

2.3. Adverse Selection

Research on the effect of information has long recognized that different parties involved in a transaction often possess different amounts of information about the transaction. Such information asymmetry exists between transaction parties in various markets, including labor markets in which employers are uncertain about the abilities of their employees, insurance markets in which insurers are uncertain about the health status of their insurants, and consumer markets in which consumers are uncertain about the quality of their prospective purchases. The result of information asymmetry is quality uncertainty [Akerlof 1970], which traditionally often occurs when consumers purchase "experience goods" [Nelson 1974] whose quality cannot be assessed prior to purchase and usage.

When buyers are uncertain about the product quality, the market is at risk of failure. George Akerlof [1970] first introduced the problem of adverse selection in a market with quality uncertainty. In his famous article, Akerlof [1970] developed a simple theoretical model for used car markets and concluded that there is no market equilibrium for such products if only the seller can determine whether a used car is bad or good. He labeled the used car markets as "markets for lemons" in which the bad cars (i.e., lemons) will drive out the good cars since they both sell at the same price and buyers are unable to distinguish the quality difference between a good car and a bad car.

Due to the physical separation between sellers and buyers, online auctions tend to be particularly susceptible to the problem of adverse selection. The literature shows that online bidders' inability to assess quality can be exploited by sellers, which often leads to the problem of adverse selection. Some researchers have demonstrated the problem of adverse selection in online auctions by indicating bidders' reluctance to pay a high price due to their uncertainty about the product quality. For example, Dewan and Hsu [2004] reported that online stamp auction prices are 10–15 percent lower than offline auction prices. Similarly, Huston and Spencer [2002] investigated eBay's coin auctions and found that auction prices are about 78 percent of the coins' estimated market price.

3. Hypotheses

Online bidders are often uncertain about the quality of the auction items due to their inability to physically inspect those items. The literature has shown that when bidders are uncertain about the value of the auction item, either the winner's curse or adverse selection may occur. To what degree the winner's curse or adverse selection may exist, however, may be determined by the level of bidders' uncertainty.

3.1. Quality Uncertainty

Different auction items are associated with different levels of quality uncertainty. For items such as software and brand new consumer electronics (e.g., mp3 players and computer processors), it is relatively easy for potential bidders to assess quality. Whereas for items such as arts and collectible goods (e.g., stamps and ungraded coins), bidders may have difficulty assessing their valuations.

When the level of quality uncertainty is low bidders are less likely to overestimate the value of the auction item, though they may still overbid because of inexperience and/or the auction fever that accompanies competitive online bidding. For example, consider that bidders bid on a new IPod mp3 player. Bidders can easily obtain product and market price information before they determine how much they are willing to pay for the item. As a result, the winner's curse is less likely to occur.

Conversely, when the level of quality uncertainty is high, online bidders may overbid not only because of their inexperience and the auction fever, but also because they are likely to overestimate the auction item's value. For example, for an ungraded antique coin, it would be very difficult for potential bidders to determine the quality level and the market price of that item. They have to estimate the value, and it is likely that overestimation may occur, which often leads to the winner's curse.

Based on the above analyses, we hypothesized the following:

H_1: The winner's curse and adverse selection both exist in online auctions.

H_2: The higher the level of quality uncertainty about the auction item, the more likely the winner's curse occurs.

3.2. Information Disclosure

To reduce bidders' quality uncertainty, sellers often send information signals on their offerings. In general, information revelation increases sellers' revenues by reducing information asymmetry between sellers and buyers

[Milgrom and Roberts 1986; Vishwanath 2004]. We examined two types of information signals in the present study—costly signals (i.e., picture posting) and costless signals (i.e., cheap talk).

Picture posting in online auctions is optional and associated with costs. For example, on eBay, the first picture is free, but each additional picture costs sellers $0.15. According to signaling theory [Spence 1974], sellers of high-quality products are more likely to accurately reveal information so as to be rewarded by offering such goods, whereas sellers of low-quality products tend to hide/lie about their product information. Picture posting is generally credible, thus providing an effective way to inform bidders. Furthermore, as indicated by Yin [2005], increased product information reduces quality uncertainty and thereby drives up price.

A number of studies have investigated the effect of picture posting on price in online auctions. The empirical results, however, were mixed. Picture posting was measured as either a dummy (i.e., picture vs. no picture) or a continuous variable (i.e., number of pictures) in the literature. Some studies have shown that picture posting led to a higher price than no picture posting [Dewally and Ederington 2006; Eaton 2005; Kauffman and Wood 2006; Vishwanath 2004; Zhang 2006], whereas others did not find a significant effect [Anderson et al. 2008; Ottaway et al. 2003]. Mixed results were also reported when picture posting was measured as a continuous variable [Hou 2007a; Song and Baker 2007]. Considering that picture posting almost becomes a norm in online auctions and that the majority of previous studies have indicated a positive effect of picture posting on price, this study hypothesizes that auctions with more pictures tend to receive a higher price than those with fewer pictures.

In order for a quality/information signal to be credible and effective, the cost of sending and honoring that signal (e.g., advertising and warranties) must matter to the signal sender [Kirmani and Rao 2000]. A cheap talk signal in online auctions is costless to send (e.g., sellers' self-made quality claims), may be truthful or not, and lacks a straightforward means for judging accuracy. As suggested by Milgrom and Roberts [1986], under a situation when a seller's claims cannot be verified prior to purchase, if strong and sure penalties for false claims do not exist, such claims can be freely duplicated. As a consequence, they become meaningless and rational consumers will choose to ignore them.

Based on the above analyses, we hypothesized the following:

H_3: *The number of product pictures is positively linked to the auction price.*
H_4: *A cheap talk signal has no effect on the auction price.*

4. Methodology

Conducting a field experiment using an existing online auction site is a relatively new method. Lucking-Reiley [1999] first developed field experiments to test equivalence between different auction formats. Standifird et al. [2005] used this technique to examine the effect of the buy-it-now function on the auction price. Resnick et al. [2006] conducted a controlled experiment on eBay to investigate the value of seller reputation. As suggested by Resnick et al. [2006], a controlled field experiment offers two main advantages. First, it makes possible a level of control as high as that in a laboratory experiment. Second, it also maintains external validity by studying consumer behavior in a real market setting.

4.1. Experimental Procedure

The present study has a 2 (high vs. low quality uncertainty) x 2 (one vs. two pictures) x 2 (with vs. without a cheap talk signal) factorial design with eight experimental conditions/cells. We first selected eBay as the experimental field because of its dominant role in the online auction industry. We then selected collectible coins as the subject of the experiment for the following reasons. First, depending on whether they are certified by a grading agency, collectible coins can have different levels of quality uncertainty; certified/graded coins have a low level of quality uncertainty, whereas uncertified coins have a high level of quality uncertainty. Thus, certification provides an effective way to measure the level of quality uncertainty. Second, coin auctions on eBay have a common-value component due to the likelihood of resale as well as bidders' inability to inspect the coin prior to purchase. Third, we intended to study a very competitive market with numerous sellers and buyers. Collectible coins, as one of the most popular product categories on eBay, satisfied this need. Fourth, collectible coins are not a low-priced item; therefore it was expected that bidders were serious about their bidding. Finally, collectible items are not volatile. Their prices tend to be relatively stable over a short period of time.

Overall, 120 1921 Morgan silver dollar coins were purchased through a non-auction e-tailer at a price of $31.95 per coin. No quantity discount was offered. As a result, there were 15 coins in each experimental condition. All of these coins were minted in Philadelphia and graded at Mint State 63 (MS63) by PCGS (Professional Coin Grading Service). Therefore, there was little quality variation among these coins. To manipulate the level of quality uncertainty, 60 coins were sold as uncertified by providing different pictures and product descriptions as compared to certified coins at the time of auctioning. Figure 1 shows the picture of uncertified coins, while figure 2 shows the

picture of certified coins. As can be seen, the sealed holder from PCGS was intentionally not shown in the picture of uncertified coins.

Figure 1: The Picture of Uncertified Coins

Figure 2: The Picture of Certified Coins

To determine the purchase price of uncertified coins, the following formula was used:

Price of Uncertified Coins = Price of Certified Coins – Certification Cost

The certification cost is $18 per coin for PCGS non-gold coins. This cost was obtained from www.pcgs.com. As a result, the price of uncertified coins was determined at $13.95 (i.e., $31.95 – $18 = $13.95).

On eBay, posting a picture has almost become a norm. For example, Dewally and Ederington's [2006] sample contained 3,664 auctions, 96.5% of which had a picture. Therefore, this study did not compare the auctions with versus without pictures. Rather, auctions with one picture (showing only one side of the coin) versus two pictures (showing both sides of the coin) were compared in this study. We believed this design was more practically realistic. To manipulate the cheap talk signal for uncertified coins, half of the auctions listed a self-made grade claim—MS63. To manipulate the cheap talk signal for certified coins, the following description was offered: "*PCGS MS63 Price Guide (www. pcgs.com): $42*." Table 1 shows different auction scenarios.

Table 1: Auction Scenarios

Experimental Conditions	Product Descriptions	Sample Size
Uncertified coins; one picture; a cheap talk signal	1921 MORGAN SILVER DOLLAR MS63	15 coins
Uncertified coins; one picture; without a cheap talk signal	1921 MORGAN SILVER DOLLAR	15 coins
Uncertified coins; two pictures; a cheap talk signal	1921 MORGAN SILVER DOLLAR MS63	15 coins
Uncertified coins; two pictures; without a cheap talk signal	1921 MORGAN SILVER DOLLAR	15 coins
Certified coins; one picture; a cheap talk signal	1921 MORGAN SILVER DOLLAR PCGS MS63 PCGS MS63 Price Guide (www. pcgs.com): $42	15 coins
Certified coins; one picture; without a cheap talk signal	1921 MORGAN SILVER DOLLAR PCGS MS63	15 coins
Certified coins; two pictures; a cheap talk signal	1921 MORGAN SILVER DOLLAR PCGS MS63 PCGS MS63 Price Guide (www. pcgs.com): $42	15 coins
Certified coins; two pictures; without a cheap talk signal	1921 MORGAN SILVER DOLLAR PCGS MS63	15 coins

As can be seen from Table 1, for uncertified coins, the cheap talk signal was manipulated by claiming that the coin grade was at MS63. For certified coins, we provided the price guide information obtained from the PCGS website. A self-made quality claim may not be credible [Hou 2007b], while a price guide may not be valued by potential bidders. Both signals were costless to send. Therefore, it was expected that these two signals would not influence the auction outcomes.

The experiment also needed to control some confounding factors. Specifically, a number of studies have empirically demonstrated that the following factors can have an effect on the auction outcomes [Gilkeson and Reynolds 2003; Kamins et al. 2004; Melnik and Alm 2002, 2005; Lucking-Reiley et al. 2007; Suter and Hardesty 2005]: the seller's reputation, the starting bid, the presence of a reserve price and buy-it-now option, the shipping

cost, the closing day of the auction (weekend vs. weekday), and the length of the auction, etc. The following discussion shows how these factors were controlled in the experiment.

For each experimental condition, a new eBay seller identity was created with no feedback ratings. There was no reserve price or buy-it-now option, and the starting bid was $0.99 for all auctions. The shipping cost was constant at $3.00. All auctions were seven days in length and closed between 6:00PM and 8:00PM Pacific Time during weekdays.

5. Results and Analysis

For each experimental condition, 15 coins were sold on eBay over a one-week period (3 coins per weekday). Overall, 120 coins were sold over an eight-week period between March and May 2008. A summary of results is provided in Tables 2 and 3.

Table 2: Experimental Conditions and Results for Uncertified Coins

Cell	Size	Purchase Price (US$)[a]	Number of Pictures	Coin Grade Information	Average Final Bid (US$)	Min. (US$)	Max. (US$)	Standard Deviation	Winner's Curse [b]
1	15	13.95	1	Yes	16.05	13.49	22.50	2.20	13
2	15	13.95	1	No	15.31	12.95	20.49	1.89	11
3	15	13.95	2	Yes	15.35	12.50	17.50	1.68	11
4	15	13.95	2	No	16.75	15.10	19.13	1.20	15
Total	60	13.95	N/A	N/A	15.87	12.50	22.50	1.83	50[c]

a: The purchase price for uncertified coins was recalculated by subtracting the certification cost of $18 (available at www.pcgs.com) from the purchase price of $31.95 for certified coins.
b: The number of auctions for which winners paid a price more than $13.95.
c: The average final bid of these 50 auctions was $16.38 and the average final bid of the rest 10 auctions was $13.28.

Table 3: Experimental Conditions and Results for Certified Coins

Cell	Size	Purchase Price (US$)	Number of Pictures	Price Guide	Average Final Bid (US$)	Min. (US$)	Max. (US$)	Standard Deviation	Winner's Curse [a]
1	15	31.95	1	Yes	29.98	24.51	34.01	2.60	4
2	15	31.95	1	No	29.81	24.49	36.00	3.39	5
3	15	31.95	2	Yes	28.63	22.26	33.01	3.50	4
4	15	31.95	2	No	29.19	25.49	33.56	2.65	3
Total	60	31.95	N/A	N/A	29.40	22.26	36.00	3.03	16[b]

a: The number of auctions for which winners paid a price more than $31.95.
b: The average final bid of these 16 auctions was $33 and the average final bid of the rest 44 auctions was $28.09.

Hypothesis 1 stated that the winner's curse and adverse selection both exist in online auctions. As can be seen from Tables 2 and 3, for uncertified coins, among 60 auctions, there were 50 winners who experienced the winner's curse and paid an average price of $16.38 that is significantly higher than the purchase price of $13.95 ($t = 11.209$, $p < .001$), while there were 10 winners who paid an average price of $13.28 that is significantly lower than the purchase price of $13.95 ($t = -4.207$, $p = .002$). For certified coins, there were 16 winners who paid an average price of $33 that is significantly higher than the purchase price of $31.95 ($t = 4.006$, $p = .001$), while there were 44 winners who paid an average price of $28.09 that is significantly lower than the purchase price of $31.95 ($t = -10.718$, $p < .001$). Therefore, Hypothesis 1 was supported.

Hypothesis 2 proposed that the winner's curse was more likely to occur when there was a high level of quality uncertainty. Tables 2 and 3 show that more winners (50 out of 60) experienced the winner's curse for uncertified coin auctions (i.e., a high level of quality uncertainty) as compared to certified coin auctions (16 out of 60) (i.e., a low level of quality uncertainty). A Chi-square analysis indicated that there was a significant difference between uncertified and certified coin auctions ($\chi^2 = 138.72$, $p < .001$). Therefore, Hypothesis 2 was supported.

Hypotheses 3 and 4 tested the effect of information disclosure on the final bid of the auction. ANOVA was performed and the results are given in Table 4. Two control variables—the number of unique bidders in the same auction and bidder expertise (measured as the number of feedback ratings)—were included in the analysis, since the literature has shown that they can have an effect on the auction outcomes [Garratt et al. 2004; Jeitschko 1997; Kagel

and Richard 2001; Kamins et al. 2004; Suter and Hardesty 2005]. For example, Suter and Hardesty [2005] demonstrated that the number of bidders can have a positive effect on the auction price. Jeitschko [1997] showed that experienced bidders learn from previous winning bids and update their beliefs. This type of learning influences their bidding strategy so that they tend to place a lower bid than bidders who have no such experience or are unaware of this effect of information. Garratt et al. [2004] further indicated that the effect of bidder expertise may still be underestimated by the experimental setting because bidders' learning is constrained by the limited duration of the auction.

Table 4: Results of ANOVA

Independent Variables	Mean Square	F	Sig.
Control Variables			
Number of Bidders	33.100	5.509	**.021**
Bidder Expertise	4.108	.451	.505
Main Effects			
Quality Uncertainty	5048.599	840.315	**.000**
Pictures	.178	.030	.864
Cheap Talk Signal	6.965	1.159	.284
Interaction Effects			
Quality Uncertainty x Pictures	19.710	3.281	**.073**
Quality Uncertainty x Cheap Talk Signal	2.315	.385	.536
Pictures x Cheap Talk Signal	25.284	4.208	**.043**
Quality Uncertainty x Pictures x Cheap Talk Signal	9.334	1.554	.215

R Squared = .894
Dependent Variable: The final bid of the auction.

As shown in Table 4, pictures and cheap talk signals had no main effect on the auction price. However, the interaction effects existed among quality uncertainty, pictures, and cheap talk signals. To further investigate this issue, separate ANOVAs were conducted for uncertified and certified coins auctions. The results are given in Tables 5 and 6.

Table 5: Results of ANOVA for Uncertified Coins

Independent Variables	Mean Square	F	Sig.
Control Variables			
Number of Bidders	3.636	1.134	.292
Bidder Expertise	1.317	.411	.524
Main Effects			
Pictures	4.876	1.520	.223
Cheap Talk Signal	3.553	1.108	.297
Interaction Effects			
Pictures x Cheap Talk Signal	20.986	6.543	**.013**

R Squared = .126
Dependent Variable: The final bid of the auction.

Table 6: Results of ANOVA for Certified Coins

Independent Variables	Mean Square	F	Sig.
Control Variables			
Number of Bidders	39.872	4.513	**.038**
Bidder Expertise	18.444	2.087	.154
Main Effects			
Pictures	7.281	.824	.368
Cheap Talk Signal	.539	.061	.806
Interaction Effects			
Pictures x Cheap Talk Signal	4.434	.502	.482

R Squared = .121

Dependent Variable: The final bid of the auction.

As can be seen from Tables 5 and 6, there were no main effects of pictures and cheap talk signals on the auction price. The interaction effect, however, was significant ($p = .013$). Figure 3 plots the interaction effect. Apparently, the number of pictures had a significantly positive effect on the auction price when there was no cheap talk signal, which further led to an increased number of winners who experienced the winner's curse (see Table 2). Specifically, the winner's curse occurred 11 times for one-picture auctions, whereas that number was 15 for two-picture auctions. Results in Table 6 indicate that both the main and interaction effects were not significant. Overall, Hypothesis 3 was partially supported, while Hypothesis 4 was supported. Considering that most variables in Tables 5 and 6 are not significant, it is not surprising that the R-squared values (.126 and .121, respectively) are relatively low.
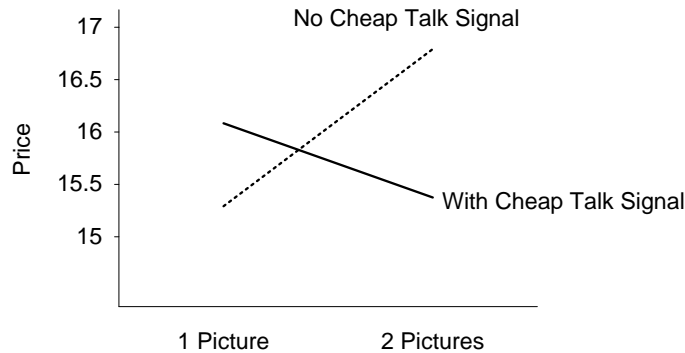

Figure 3: The Interaction Effect of Pictures and Cheap Talk Signals
on the Auction Price

This section closes with several other observations on the results. First, the number of bidders had a significantly positive effect on the auction price, indicating that competition drove up the price ($F = 5.509$, $P = .021$). This finding is consistent with the literature [Hou 2007a; Song and Baker 2007; Suter and Hardesty 2005; Zhang 2006]. It should be noted, however, this effect only existed when there was a low level of quality uncertainty (see Tables 5 and 6). A further examination indicates that certified coin auctions were more competitive than uncertified coin auctions, though the result was not significant ($t = .469$, $p = .640$); specifically, the average number of bidders was 5.22 for certified coin auctions, whereas that number was 5.07 for uncertified coin auctions. Second, this study did not find the effect of bidder expertise on the auction price ($F = .451$, $P = .505$). This result is also consistent with prior research [Gilkeson and Reynolds 2003; Ottaway et al. 2003].

6. Conclusions

The literature has shown empirical evidence for both the winner's curse and adverse selection in online auctions. Some researchers identify a higher online auction price than the offline/e-tailing market price for the same item, whereas others indicate the opposite. This remarkable inconsistency certainly demands further investigation. By using a field experiment on a popular consumer-to-consumer online auction site (i.e., eBay), this study was able to

directly compare prices between online auctions and e-retailers. The present study intends to make a contribution by clarifying and integrating previous empirical findings into a coherent body of knowledge.

The experimental results in this study indicate that both the winner's curse and adverse selection exist in online auctions. The extent to which either occurs depends on the level of online bidders' quality uncertainty about the auction item. Specifically, the winner's curse is more likely to occur when there is a high level of quality uncertainty, while adverse selection is more likely to occur when there is a low level of quality uncertainty. In other words, when buyers know how much an item is worth, they tend to look for bargains at online auctions. As can be seen from Table 3, the average final bid of 60 certified coins was $29.4, which was significantly lower than the purchase price of $31.95 ($t = -6.508$, $p < .001$).

This study also examined the role of information disclosure in determining the auction price. The results show that a cheap talk information signal does not reduce the level of quality uncertainty, thus is often ignored by online bidders. The results, however, do not show a main effect of picture posting on the auction price. One explanation is that two pictures are still not good enough as compared to one picture. Sellers may need to post more pictures if they want to be rewarded by offering high-quality items. Another possible explanation is the fact that because this experiment created sellers with zero feedback ratings, bidders may have some reservations about their picture posting. In other words, there may exist an interaction effect between picture posting and seller reputation; the higher the seller's reputation, the stronger the effect of picture posting on the auction price. Future research may investigate this issue.

The results of this study have important implications for online auctioneers and bidders. For auctioneers, understanding the role of information disclosure helps them improve their auction designs. The key is to provide credible and valuable information. Conversely, online bidders should be aware of the winner's curse problem and adjust their bidding behavior accordingly. This is particularly true in auctions with a high level of quality uncertainty and a large number of bidders, because winning under this situation may imply a greater chance of facing the winner's curse.

As with many other field experiment studies, this research has several limitations, some of which provide avenues for future exploration. First, unlike a lab experiment, a field experiment has no control over the market condition. It is possible that the fluctuation of supply and demand over the experimental period may have influenced the auction outcomes. Future research may use multiple research methods—observational studies, lab experiments, and field experiments—so as to increase the internal and external validity.

Second, the present study may underestimate the degree of the winner's curse for the following two reasons. First, the auctioneers in the experiment had no feedback ratings, while it has been widely reported that sellers' feedback ratings drive up the auction price [Lucking-Reiley et al. 2007; Melnik and Alm 2002, 2005; Resnick et al. 2006]. Second, the experiment increased the supply of a specific type of coin without changing the demand. As a result, the whole market price may have been a bit lower over the experimental period.

Third, this study focused on a relatively competitive market with a large number of sellers and buyers. Future research may select a less competitive market with few traders (e.g., rare antiques). It is possible that the winner's curse problem is less likely to occur since bidders are less likely to become "caught up" in a less-competitive bidding environment. In addition, this research investigated a product category with a possibility of resale. Future research may examine a product category where online bidders purchase largely for their own consumption (e.g., brand new vs. used consumer electronics). Brand new consumer electronics are often associated with a low level of quality uncertainty, while used ones tend to have a high level of quality uncertainty. It would be interesting to expand this study by examining different markets and product categories.

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