

Auction Experience, Category Knowledge and Trust in eBay Stamp Auctions*

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We empirically examine the impact of online auction knowledge and category-specific knowledge on the final price of online auctions. Specifically, we question how the relationship between buying and selling experiences affects the final prices of online auctions. Related to the trust between buyers and sellers, we examine the multiple interactions between a buyer-seller pair and aim to identify how these repeated transactions influence the final price.

To contrast these effects with other product related factors, we focus on so called 'common value' auctions of vintage stamps on eBay, in which the ex-post value of the product is the same among participating agents' perceived value. Online auction of stamps provides a representative setting to examine the relationship between market experience and the auction participation behavior in the common value auction, as it provides the book value of stamp as well as price variation across individual buyers with different expertise levels. Our analysis of over 3000 stamps auctions on eBay indicates a significantly high frequency of buyer-seller (pair) interactions, thus suggesting a 'relationship view' of auctions.

The work validates five hypotheses derived from the existing theory in economics, marketing, and information systems. Through the common-value auction data, we find that seller's online auction experience and category-specific experience favor sellers by increasing the final price. However, buyer's online auction experience does not affect the final price, but buyer's category-specific experience favors buyers by decreasing the final price. We find that the trust between two trading parties increases the final price.

Keywords : Economic Theory, Common Value Auction, eBay, Experience, Knowledge, Trust

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I. Introduction

What are the factors that may affect the final prices of online auction items? Factors including perceived risk of consumers about quality, price, and delivery have been investigated in several disciplines including marketing, economics, and information systems. Ordinarily, sellers know better than buyers about the products on auctions since buyers cannot physically assess the products until they are delivered. Such information asymmetry, resulting from the impersonal nature of the online auction, may expose participating buyers to higher levels of risks than traditional offline markets do. Akerlof [1970], in his seminal article, suggested how markets with high information asymmetry give rise to uncertainty and opportunistic behavior of sellers typically shown through incomplete disclosure or misrepresentation of product quality. This information asymmetry problem becomes much more complicated when the transaction involves items with subjective quality definitions, e.g. antiques or collectibles. Winners of such auction items are likely to be the bidders who have the highest estimation of the value. Therefore, they may experience either monetary loss in the subsequent trade or disappointment if the quality of the product does not match his estimation.

However, increasing buyer-seller experience and market knowledge may significantly reduce information asymmetry, thereby producing significantly differing outcomes from traditional auction models [Kagel and Richard, 2001]. A buyer's knowledge about the marketplace is based on two fundamental sources: (a) *the medium of exchange* (online auction knowledge),

and (b) *the specific product category* (category-specific knowledge). Their findings suggest that a buyer's valuation of a product reflects the buyer's knowledge about the product category and as specific transaction-making medium. Extant marketing literature suggests that participants' knowledge about or experience in the marketplace and as specific product-category benefits their transactional performance. Further, behavioral pricing theory posits that *prior knowledge and experience within a specific product category* influences the prices or acceptable price ranges that consumers are willing to pay for a specific quality level [Lichtenstein, Bloch and Black 1988; Rao and Monroe, 1988]. As market participants become more experienced with a specific product category, they become knowledgeable about not only specific attributes (i.e. "what to look for" factors) and the evaluation process but also price variations and standard price-quality relationships within a specific market domain.

Online auction often involves repeated encounters between the same seller and buyer. Real world issues such as bidder learning, collusive behavior between buyers and sellers and opportunistic 'auction gaming' [Bower and Bunn, 2001] can have important consequences on the auction dynamics and selling price. The possibility of forming collusion between the buyer and the seller has been little studied in the theoretical literature, partly because auction theory is primarily based on non-cooperative game theory. In order to reduce the problem of asymmetric market information and its adverse consequences, academics and practitioners alike have identified "trust"¹ as one of the most desired factors in developing and

maintaining a close relationship between a buyer and a seller [Morgan and Hunt, 1994]. Indeed, trust reduces complexity and provides sellers and buyers with assurance that their desired outcomes will be obtained. In this way, trust can also serve as a catalyst in many buyer-seller transactions, boosting buyers' expectations for satisfying exchange relationships. In order to build the trust, individuals may go through multiple repeated transactions to find their potential long-term trade partners. Unlike the traditionally suggested game-theoretic environment of auctions, we find multiple occurrences of repeated transactions in a buyer-seller pair, showing traits of the formation of a collusive relationship.

Most of the literature on auctions has focused on the one-shot nature of auction of a single indivisible good. Existing studies have used a seller's reputation as the only indicator of price. Dellarocas [2003] provides an extensive survey of primary findings of research investigation upon eBay's feedback mechanism. Thus far, the impact of feedbacks on the final price has been a controversial issue with conflicting research results:

- (a) Bajari and Hortacsu 2003 on coins, "only positive feedback has a significant effect on the final price."
- (b) Dewan and Hsu 2002 on stamps, "higher net score increases the price."
- (c) Kauffman and Wood 2000 on coins, "only negative feedback seems to increase the

price based on a univariate analysis."

- (d) Lucking-Reiley *et al.*, 2000 on coins, "only negative feedback reduces the price."
- (e) Melnik and Alm 2002 on gold coins, "positive feedback increases and negative feedback decreases the price."
- (f) Resnick *et al.*, 2002 on vintage postcards, "established sellers command higher prices than new comers. Among the new-comers, negative feedback, unless much accumulated, has little effect."

However, it is not fully explored whether a buyer's reputation and his or her previous auction experiences have any impact on his or her bidding price [Wilcox, 2000]. Past studies have assumed online auctions as spot transactions and short-termed motives of buyers and sellers.

In this paper, we empirically examine the impact of online auction knowledge and category-specific knowledge on the final price of online auctions. We are interested in examining not only the effect of buyer-seller knowledge but also their dyadic relationship on the performance of online auctions. Specifically, we question how the relationship between buying and selling experience affects the final prices of online auctions. To study the trust between buyers and sellers, we examine the multiple interactions within a buyer-seller pair with an aim to identify how their repeated transactions influence the price. We also attempt to suggest a framework for studying both haggling effect on buyer's and seller's learning process and trust among repeated pairs of buyers and sellers. This task is deemed important; if involved parties engage in auctions with a myopic motivation, a high level of opportunistic

1) Trust can be defined as *the subjective assessment of one party that another party will perform a particular transaction according to his or her confident expectations in an environment characterized by uncertainty* [Ba and Pavlou, 2000].

behavior can be expected. For this reason, the prevalence of well-recognized on-line auction systems such as eBay can contribute to motivating sellers to develop long-term perspectives toward on-line transactions. From the buyer-seller relationship perspective, we ask if the relationship aspect of the transaction can change the buyer-seller behaviors and hence, the bidding price.

To contrast these effects with other product related factors, we focus on so called 'common value' auctions of vintage stamps on eBay, in which the ex-post value of the product is the same among participating agents' perceived value. Online auctions of stamps are representative settings for us to examine the relationship between market experience and the auction participation behavior in the common value auction, as they provide both book value as well as price variations across individual sellers and buyers with varying expertise levels. Auction participants may have their own internal reference price levels, and they can use their cognitive positions as subjective comparison points. The role of the relationship can be particularly important since stamp belong to, namely, an "experience" product category with attached private-value. Our analysis of over 3000 stamps auctions on eBay indicates significantly high frequency of buyer-seller (pair) interactions, thus buttressing a 'relationship view' of auctions.

2. Motivation and Objectives of Online Auction Participants

Buyers and sellers in online auctions may

have two conflicting objectives. As suggested in <Figure 1>, the motives of buyers and sellers can be classified based on their short-term (opportunistic) and long-term (relationship-based) approaches:

- *Short-term Objectives*-Maximizing their unit profit is the short term objective of the participants. Buyers and sellers focus on one-shot transactions with no intention to deal again with the same trading partners. This objective fosters gaming and opportunistic behaviors toward the counterpart. The buyer may engage in minimizing his outlay without consideration for the seller, product, or service quality. The seller with his intention to maximize his profits can be caught between the temptation to price higher by withholding product-quality information and the risk of not being able to sell at all at the end.
- *Long-term Objectives*-Maximizing their trust is the long-term objective of the participants. It fosters sustainable relationship building between buyers and sellers and motivates repeated transactions. The buyer is motivated to engage in trusting relationships to reduce search costs and ensure product/service quality from the transaction. The seller is motivated to provide above-normal product and service quality to the buyer. For example, say a stamp seller has four units of similar stamps (same description, but varying qualities). A seller who has a long-term motivation will ship out the stamp with the highest quality to the buyer (with whom he is inclined to build a relationship), so as to exceed the buyer's expectation and, eventually, gain his/her loyalty. Such ex-

pectation from the seller may also motivate the buyer to be willing to pay higher prices than his initial estimation.

Due to nature of asymmetric information about each other's motivation and objectives, buyers and sellers rely on proxy measures to make judgments about the expected behavior of the other party. Then, the salient questions are: a) what kind of seller profiles will influence short-term and long-term objectives?; and b) can sellers in these categories be identified using reputation and experience indicators?

3. Online Auctions and the theory of Winner's Curse

In online stamp auctions, buyers bid for a stamp whose value is unknown to the buyers. Unlike in a traditional auction, the buyers cannot examine the stamp physically until they win the auction and the stamp is delivered. Therefore, buyers bid based on their own subjective estimations derived from surrogate cues. However, the value of the stamp is the same or similar to all buyers once its quality is identified. Because of this intrinsic nature of the product value in which buyers have the common value about the stamp but bid based on different estimations, a stamp auction can be considered as a *common value* auction. Thus, the winner of the auction is often the buyer who has the highest estimation. This may happen systematically in stamp auctions in eBay. The winner may even have so high estimation of the stamp that the winning bid may far exceed the actual value of the stamp. Reversely, when the winning bid is less than the actual value,

then the actual value of the stamp may turn out to be less than his estimation. In both cases the winner is cursed, which is called "the winner's curse." On the contrary, experienced buyers (general auction experience or product category experience) are likely to pay a lower normalized final price²⁾ as they may have realized or observed what typically happens to the winners in the previous auctions. We also hypothesize that either a collaborative or competitive relationship between buyers and sellers should determine this normalized final price.

4. Role of Knowledge and Experience

Reputation has a long history of having been treated as the most central asset to the workings of the marketplace. The impact of a seller's reputation on the process and outcome of transactions has been a widely-studied and well-accepted phenomenon, both in marketing [Andaleeb, 1995; Morgan and Hunt, 1994; Anderson and Weitz, 1992, Dahlstrom and Nygaard, 1995] and economics [Klein and Leffer, 1981; Shapiro, 1983; Allen, 1984].

The prevalent hypothesis suggests that the past reputation of the seller should act as a mechanism of transferring information about the seller's current (expected) behavior to the buyers. i.e., a seller's good reputation may reduce the level of information asymmetry, there

2) Normalized Final Price of a product is the winner's purchase price divided by the estimated market value of that product. e.g. Scott Publishing Company produces a catalog of U.S. and foreign stamps listing estimated market values for each stamp.

by reducing risk perceptions. Seller's reputation is also considered as a proxy for the product and transaction quality characteristics that are unobserved prior to the transaction. If a market is efficient enough to accurately reflect sellers' reputation, buyers are willing to compensate reputable sellers with price premiums to assure safe transactions; buyers' trust in sellers' credibility helps reducing perceived transaction-specific risks, allowing sellers to obtain price premiums. In this, the important and interesting aspect of online auction reputation mechanisms is that the seller's credibility is not built upon his or her past experiences with the specific buyer but from other previous buyers. The impact of sellers' reputation on the perceived risk of transaction can be explained using a cognitive imitation dynamics (or institutional theory) argument. That is, the inverse relationship between sellers' reputation and perceived risk is based on the 'What is good for others is good for oneself' reasoning.

4.1 Impact of Seller's Online Auction Experience

McKnight *et al.* [2002] discuss the two aspects of institution-based trust: situational normality belief and structural assurances belief. *Situational normality* deals with understanding the social norms that exist within an institution or, in this research, a marketplace.

Sellers with more experience are more likely to minimize the uncertainty felt by a potential buyer. We expect that experienced online sellers knowhow to minimize uncertainty for the buyers better than inexperienced online sellers do. Since an experienced seller is supposed to

use lessons learned in past auctions to give his item listings more appeal, and the bidder may feel, as a result, that the experienced seller has shown a dedication to the auction and is less likely to act opportunistically. The experienced seller understands the necessity to provide as much critical information as possible to make the items most appealing in the hopes of eliciting the highest bid. Further, an experienced seller is more likely to provide convenience and flexibility in terms of payment options, shipping options, post-sale support, and the like to the buyer. Thus, an online bidder will have a higher valuation for an item when a more experienced seller hosts that auction. We also hypothesize that the seller's experience with a specific product category should also affect in the similar context with overall auction experience.

H1a: Seller's overall Auction Experience (SAE) increases normalized final price.

H1b: Seller's category-specific experience (CE) increases normalized final price.

4.2 Impact of Buyer's Knowledge and Experience

Consumer Psychology studies are replete with examples of use of mental problem-solving shortcuts, known as cognitive heuristics. Cognitive heuristics are used to reduce the effort involved in processing more complicated decisions. Quite frequently, customers use preconceived notions or past experiences as heuristics to evaluate complex issues with ill-structured problems with incomplete information.

The reinforcement learning argument sug-

gests that '*past success is a good predictor of future chances.*' General online auction knowledge may allow experienced bidders (as market mavens) to more accurately project (a) how certain items will be auctioned and (b) the expected "going rate" or winning price for similar items. Existing literature in experimental economics [Kagel and Levin, 1996; Phillips, Battalio, and Kogut, 1991; Rustroem, 1998] points to the general conclusion that auction buyers learn through repeated transactions. Borle *et al.* [2006] found that experienced bidders in eBay auctions (10,000 auctions across 15 product categories) are more active either at the beginning or at the end of the auction. Buyers' knowledge about the marketplace is based on two fundamental sources: (a) *the medium of exchange* (e.g. eBay), and (b) *the specific product category* (e.g. stamps). These findings suggest that a buyer's valuation of a product will be a function of the buyer's knowledge about the product category and the specific transaction-making medium.

4.2.1 Online Auction Knowledge

Once a buyer understands the social norms of an institution or has experienced enough success through transactions with different sellers in a marketplace, that buyer will begin to learn so called "*the tricks of the trade.*" Kagel and Richard [2001] show that, as the bidders become more experienced, the probability of a *winner's curse* diminishes. Garratt *et al.* [2002] also shows that experienced bidders exhibit no greater tendency to overbid than to underbid unlike inexperienced bidders. Therefore, subsequent biddings of the auctions result in a de-

crease in a bidder's price paid for an auction item. Wilcox [2000] found that increasing bidder experience tended to lead to behavior in line with that suggested by the Nash equilibrium, which implies that more experienced bidders will wait to make bids in the final moments of an auction. This strategy conveys less information to other bidders, which lowers the final price of the item. In this case, the reserve is less likely to be met. In addition, in unre-served auctions the final closing price is likely to be lower. More experienced bidders are also less likely to make multiple bids in the same auction. This serves to suppress the information available to other bidders, which would have a negative impact on success and closing price [Wilcox, 2000]. Lind and Plott [1991] found that participants' experience does not entirely eliminate the winner's curse but can effectively reduce the magnitude and the frequency of losses..

On the other hand, institution-based trust theory suggests that as buyers gain experience in online auctions, they develop trust in the auction market structure which motivates them to pay more. Once a buyer understands the standard norms of an institution or has enough successful transactions with different sellers in a marketplace, that buyer is likely to accept that the behavior of the few sellers he or she had positive experience with is the general behavior to be expected from the rest of the sellers in the marketplace. That is, once a buyer has made several purchases and has received the item promised, that bidder will begin to believe that sellers' opportunistic behavior is an exception, not the norm, in that environment. Pavlou and Gefen [2004], in their inves-

tigation of intentionality to transact within online auctions find that, a successful transaction with a seller not only motivates trust with that seller, but also in the entire community of sellers.

Alternatively, we argue that as auction bidders become more experienced they become more realistic with the actual value of the product. Often observed are new auction buyers engaging in an unrealistic practice where buyers assume that auction marketplaces yield much lower prices compared to non-auction marketplaces. As buyers become experienced, their perception changes toward the realistic nature that auction prices are not as low as they initially thought it would be. Therefore, we hypothesize:

H2a: Buyer's online Auction Experience (BAE) decreases normalized final price.

4.2.2 Category-specific Experience

Kagel and Levine [1986] studied common value auctions with experienced subjects. They found that with experience bidders' judgment improved; however, this improvement was situational and restricted to the specific experienced auction.

For auctions of products that may attract both experts and non-experts, the non-expert(s) bidder(s) will tend to have the highest winning bid(s) at the end of the auction. As a result, the non-experts will always dominate the auction market and thus are likely to incur the winner's curse.

Bidders that enter this market are generally not professional buyers. However, stamp auc-

tion marketplace requires buyers of specific knowledge/experience to understand the quality of product. The stamp marketplace is a great venue to test category-related hypotheses we are dealing with. Buyers in the stamp auctions seem to have high experience with buying stamps.

Research in marketing suggests that consumers who engage in information search in a product category gain increased product and market knowledge. This leads to future buying efficiencies and better purchase decisions, including cost savings [Bloch *et al.*, 1986; Punj and Staelin, 1983].

Auction participants' past knowledge affects both the reference price level and the width of price acceptability [Rao and Sieben, 1992]. Participants with more knowledge of price distributions (in a specific product category) are more likely to notice any deviations from their reference price levels.

H2b: Buyer's Category-specific Experience (BCE) decreases normalized final price.

4.3 Impact of Buyer-Seller Relationship

Trust has formed the basis for all buyer-seller relationships. Trust-laden transactions are more likely to provide the buyers with a sense of reliability and hence a more satisfying experience with the seller. Buyer-seller relationships become especially critical amidst two situational factors: (a) uncertainty (risk), and (b) information asymmetry [Swan and Nolan 1985].

Coleman [1990] suggests that familiarity and repeated interactions form the basis of social

trust between two parties. Repeat purchase behavior becomes a critical issue on internet-based transactions which are characterized by anonymity and spatial and temporal separation of players.

Reciprocity models conjecture that people tend to be kind in response to kindness. In an online auction, a seller may ship a better quality product with better packaging when the buyer bids a higher price, which prompts the seller to anticipate increased payoffs in the long-run from this buyer. Experienced sellers with long history have more to lose from negative reputation than inexperienced sellers with less history.

Unlike what has been suggested and assumed in past literature, online transactions (e.g. eBay auctions) do not necessarily conform to spot transactions. Over the past few years, there is an increasing trend of sellers building a deep and long-term relationships with given buyers. The seller's online façade (i.e. identity) becomes his/her brand name.

Ba and Pavlou [2002] show that appropriate feedback mechanisms *may induce calculative credibility trust without repeated interactions* between two transacting parties and that an online bidder's trust in a seller leads to an increased willingness to pay for items. They show that a successful experience with a single seller causes an increased seller-based trust, thereby increasing the buyer's willingness to pay for items from that seller. Traditional economic theories often emphasize the significance of the value of an item for a buyer. In case of repeat purchase from the same seller, the buyer's perceived value (independent private value) increases due to positive previous transactions

with the seller and the ensuing relationship.

H3: Buyer-Seller Trust increases the winner's curse

5. Second Price Auction Model

In order to analyze the final bidding price and its determinants, our model starts from the well-established economic notion of second-price single-object auction. The second highest bid, final price of e-bay auction is given by:

$$b_2 = a \frac{E_s^\alpha}{E_b^\beta} \nu_2, \quad i = 1, 2, \dots, N, \quad (1)$$

$$\nu_1 > \nu_2 > \dots > \nu_N$$

where b_i : the bidding price of i^{th} bidder, ν_2 : the second highest bidder's value for the item in the auction, E_s is the level of learning of the seller, E_b is the level of learning of the buyer, α, β : learning adjustment coefficients and N : the number of bidders in the auction. We proceed from the above formulation to include several unique properties of stamp auction:

- (i) There is a book value (Scott Value). If the stamp is in the perfect condition, Scott value would represent the individual valuation.
- (ii) The monetary value to the bidder is uncertain based on the learning levels of seller and buyers and levels of the trust.
- (iii) There is an opening price of the auction that reflects the minimum value of the stamp.
- (iv) The number of bids can be observed. The marginal impact of this number will get small as it increases.

Therefore, we can rewrite equation (1) based on the above facts such that

$$\frac{b_2}{S} = a \left(\frac{n}{n+1}\right)^\kappa \left(\frac{m}{S}\right)^\lambda \frac{E_s^\alpha}{E_b^\beta} T^\gamma \quad (2)$$

where n is the number of bids, S is Scott Value, m is an opening price, T is the level of trust between buyer 1 and seller, and γ is the trust adjustment coefficient. Winner's curse is defined as $\frac{b_2}{S}$.

In order to reflect our discussion on online auction experience and category-specific experience of both buyer and seller, we formulate our model as:

$$\frac{b_2}{S} = a \left(\frac{n}{n+1}\right)^\kappa \left(\frac{m}{S}\right)^\lambda \frac{E_{sAE}^{\alpha_1} E_{sCE}^{\alpha_2}}{E_{bAE}^{\beta_1} E_{bCE}^{\beta_2}} T^\gamma \quad (4)$$

For the purpose of linear regression, equation (4) can be transformed to:

$$\log \frac{b_2}{S} = \log a + \kappa \log \frac{n}{n+1} + \lambda \log \frac{m}{S} + \alpha_1 \log E_{sAE} + \alpha_2 \log E_{sCE} + \beta_1 \log E_{bAE} + \beta_2 \log E_{bCE} + \gamma \log T \quad (5)$$

6. Method

Millions of items are listed on eBay everyday. eBay listings are grouped into thousands of categories, among which stamp auctions can be a representative common value auction that is worthy of being examined. The book value of these stamps traded in eBay auctions can be measured using the Scott Standard Postage Stamp Catalogue, which is published annually and widely used as the source of valuing stamps.

We analyzed 5587 listings collected from eBay stamp category between June 1 and August 31 of 2001. In order to examine the winner's curse, we focus only on stamps in mint condition and never hinged. eBay Listings typically contain detailed descriptions about the item, seller, and bidding history including Scott number, Scott value, starting bid, final bid,³⁾ number of bids, seller's id, seller feedback rating, buyer feedback rating, and so forth. Among these observations, we identified 402 unique sellers from 35 countries and 631 unique buyers. The majority of stamps are originated from China (3601) and Taiwan (1723). The rest are from Hong Kong (151) and Macao (112). Among those observations, 3572 observations are used for statistical analysis after filtering auctions ended up not being sold, auction items purchased by Buy-It-Now, and several outliers. <Table 1> summarizes the statistics of variables captured from the filtered auction listings. <Table 2> describes descriptive statistics of independent and dependent variables, which would be analyzed using a linear regression. <Table 3> describes the measures we used for the regression analysis.

Given the above equation (5), we run a linear regression using learning-curve fitted experiences and trust. For the curve fitting of learning-related variables, we used the following steps. First, we examined distributions of learning and trust and choose parameters for the curve. To estimate the level of knowledge and experience, we use a growth curve such that $1 - e^{-kx}$ where x is the frequency of learning

3) Final bids are reported on the bid history page. These final bids are the maximum willingness to pay expressed by each buyer.

<Table 1> Descriptive Statistics of Variables from the Filtered Auction Listings

	Minimum	Maximum	Mean	Std. Deviation
Scott Value	.40	3500.00	66.21	211.65
Number of bids	1	40	4.58	4.40
Start bid	.01	1000.00	13.86	36.84
End bid	.01	1925.00	31.96	89.21
Seller rating	0	3425	498.76	568.13
Buyer rating	-4	2106	84.80	114.11
Winner's curse	.011	3.85	.59	.35
Seller's frequencies	1	508	168.76	199.32
Buyer's frequencies	1	109	32.75	31.08
No. of Repurchase	1	70	7.54	12.36

<Table 2> Descriptive Statistics of Independent and Dependent Variables

	Minimum	Maximum	Mean	Std. Deviation
Seller's overall auction experience (SAE)	0.000	1.000	0.530	0.351
Buyer's overall auction experience (BAE)	0.000	1.000	0.410	0.336
Seller's category-specific experience (SCE)	0.079	1.000	0.825	0.272
Buyer's category-specific experience (BCE)	0.083	1.000	0.710	0.311
Buyer-Seller Trust	0.000	.900	0.192	0.211
Winner's curse	0.011	3.846	0.590	0.346

<Table 3> Measurement of Independent Variables

Measures	Implementations
Seller Online Auction Experience	We use Seller Rating as an indicator of its auction experience.
Seller Category-specific Experience	Count of the total number of times, the seller has sold an item in the specific product category in a 4-month period ⁴⁾
Buyer Online Auction Experience	We use buyer's rating as an indicator of its auction experience.
Buyer Category-specific Experience	Count of the total number of times, the buyer has bought an item in the specific product category in a 4-month period.
Buyer-Seller Trust/Relationship	Number of times buyer and seller have transacted with each in the past ⁵⁾

reinforcements and k is the parameter. We used

4) We assume that the number of buying/selling in a 4-month period is a true representation of buyer's/seller's overall category experience. The number of transactions also represents the frequency of learning reinforcements.

5) We assume that the number of buyer-seller trans-

$k = 0.01$ consistently for buyers knowledge and experience, seller's knowledge and experience,

action in a 4-month period is a true representation of that buyer-seller similar relationship in the past i.e. if they transaction 20 times in a 4-month period, they did the same in the previous time periods as well.

and the degree of trust between them. We used the following formula to fit the data to the curve:

$$\left(1 - e^{-\frac{\text{mean} + 2 \times \text{std_dev}}{\text{max_value}} \times 0.01 \times x}\right) \quad (6)$$

Based on equation (6), we have the following measures for determinant variables:

(a) Seller's online auction experience

$$(\text{SAE}) = \left(1 - e^{-\frac{498.76 + 2 \times 568.13}{3425} \times 0.01 \times x}\right),$$

(b) Seller's category specific experience

$$(\text{SCE}) = \left(1 - e^{-\frac{168.76 + 2 \times 199.3}{508} \times 0.01 \times x}\right),$$

(c) Buyer's online auction experience

$$(\text{BAE}) = \left(1 - e^{-\frac{84.8 + 2 \times 114.11}{2106} \times 0.01 \times x}\right),$$

(d) Buyer's category specific experience

$$(\text{BCE}) = \left(1 - e^{-\frac{32.75 + 2 \times 31.08}{109} \times 0.01 \times x}\right),$$

and (e) Degree of

$$\text{Trust} = \left(1 - e^{-\frac{7.54 + 2 \times 12.36}{30} \times 0.01 \times x}\right).$$

tion is conducted based on equation (5). Using correlation reported in <Table 4>, we check for any multi-collinearity problem but do not find any serious problem.

The results of the regression analysis are as depicted in <Table 5>. Adjusted R-square of the regression model is 0.243, which indicates that 24.3% of the variability of normalized final price can be explained by the independent variables.

Base on the coefficient of the regression, we can rewrite equation (5) such that:

$$\begin{aligned} \log \frac{b_2}{S} = & -0.493^{**} + 0.533^{***} \log \frac{n}{n+1} \quad (7) \\ & + 0.183^{***} \log \frac{m}{S} \\ & + 0.022^{***} \log E_{SAE} + 0.018^{**} \log E_{SCE} \\ & - 0.002 \log E_{BAE} - 0.019^{***} \log E_{BCE} \\ & + 0.038^{***} \log T, \end{aligned}$$

where ^{***}, ^{**}, ^{*} denote significance at 1%, 5%, 10% error levels, respectively.

Tracing back to equation (5), we can rewrite

7. Regression Analysis

In order to test hypotheses, a linear regres-

<Table 4> Correlation Matrix

	log_wincurse	log_num bids	log_FirstBid	log_SAE	log_SCE	log_BAE	log_BCE
log_num bids	0.143([*])						
log_FirstBid	0.323(^{**})	-0.493(^{**})					
log_SAE	0.092(^{**})	-0.031	0.099(^{**})				
log_SCE	0.159(^{**})	-0.099(^{**})	0.218(^{**})	0.166(^{**})			
log_BAE	-0.038([*])	-0.019	-0.017	0.013	-0.052(^{**})		
log_BCE	0.026	-0.065(^{**})	0.088(^{**})	0.040([*])	0.169(^{**})	0.096(^{**})	
log_Trust	0.133(^{**})	-0.130(^{**})	0.185(^{**})	0.106(^{**})	0.535(^{**})	-0.099(^{**})	0.532(^{**})

Note) ^{**} Correlation is significant at the 0.01 level (2-tailed).

^{*} Correlation is significant at the 0.05 level (2-tailed).

<Table 5> Linear Regression

	Unstandardized Coefficients	Standard Error	Standardized Coefficients	t-statistic	p-value	Related Hypothesis
Constant	-.493	.020		-24.451	.000	
Log of (n/(n+1))	.533	.023	.401	23.435	.000	
Log of (opening bid/Scott Value)	.183	.006	.498	28.497	.000	
Log of Seller's Auction Experience (SAE)	.022	.008	.042	2.774	.006	H1a
Log of Seller's Category Specific Experience (SCE)	.018	.007	.046	2.527	.012	H1b
Log of Buyer's Auction Experience (BAE)	-.002	.006	-.007	-.444	.657	H2a
Log of Buyer's Category Specific Experience (BCE)	-.019	.007	-.048	-2.638	.008	H2b
Log of Buyer-Seller Trust	.038	.009	.090	4.202	.000	H3

Note) Dependent Variable: log_wincurse.

the above equation as:

$$\frac{b_2}{S} = 10^{-0.493^{***}} \left(\frac{n}{n+1}\right)^{0.533^{***}} \left(\frac{m}{s}\right)^{0.183^{***}} \quad (8)$$

$$\times \frac{E_{sAE}^{-0.022^{***}} E_{sCE}^{0.018^{***}}}{E_{bAE}^{-0.002} E_{bCE}^{0.019^{***}}} T^{0.038^{***}}$$

From the p-values of determinant variables, we validate the following hypotheses:

- (a) We accept H1a that Seller's online auction experience increases normalized final price.
- (b) We accept H1b that Seller's category-specific experience (CE) increases normalized final price.
- (c) We reject H2a that Buyer's online auction experience (AE) decreases normalized final price.
- (d) We accept H2b that Buyer's Category-specific Experience (CE) decreases normalized final price.
- (e) We accept H3 that Buyer-Seller Trust increases normalized final price.

8. Conclusion and Discussion

As we started out with the question, "what are the factors that may affect the final price of the online auction items?," we empirically examine the impact of online auction knowledge and category-specific knowledge of auction participants on the final price based on the theories from several disciplines including economics, marketing, and information systems. Specifically, we question how the relationship between buying and selling experiences as well as the trust between buyers and sellers affects the final prices of online auctions.

To contrast these effects with other product related factors, we focus on so called 'common value' auctions of vintage stamps on eBay, in which the ex-post value of the product is the same among participating agents' perceived values. The data provides a representative setting for us to examine the relationship between

market experience and the auction participation behavior especially in the context of the common value auction in which both the book values and price variations depending on individuals' varying expertise level can be observed. Our analysis of over 3000 stamp auctions on eBay indicates a significantly high frequency of buyer-seller interactions, thus corroborating a "relationship view" of auctions.

The work validate sour hypotheses about the relationship view of buyer and seller. In the data, we find that a seller's online auction experience and category-specific experience favor sellers in general by increasing the final price. However, a buyer's online auction experience does not necessarily affect the final price but buyer's category-specific experience favors buyers by decreasing the final price. Interestingly, we also find that the trust between two trading parties increases the final price unlike what

many would have expected.

Our findings can help individuals or firms better understand the nature and dynamics of online common value auction. That is, long-term dyadic relationships and category-specific knowledge of buyers and sellers play significant roles in the common value auction environment. Managers of online auction marketplace may also find useful implications in our studies to better design their market mechanisms from the relationship view on participating customers.

This paper is limited by generalizing the theory through the observations of stamp auctions on eBay; nonetheless, it can still contribute to the stream of research in testing theories about varying items in online and offline auction marketplaces. We hope that we can investigate other common value auction items on eBay as well as on other auction websites in future research.

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