Evidence of the Effect of Trust Building Technology in Electronic Markets: Price Premiums and Buyer Behavior

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Abstract

Despite the wide use of reputational mechanisms such as eBay's Feedback Forum to promote trust, empirical evidence has shown conflicting results on whether online feedback mechanisms really induce trust and lead to higher auction prices. This study examines the extent to which trust can be induced by proper feedback mechanisms in electronic markets, and how some risk factors play a role in trust formation. Drawing from economic, sociological, and marketing theories and using data from both an online experiment and an online auction market, we demonstrate that appropriate feedback mechanisms can induce calculus-based credibility trust without repeated interactions between two transacting parties. Trust can mitigate information asymmetry by reducing transaction-specific risks, therefore generating price premiums for reputable sellers. In addition, the research also examines the role that trust plays in mitigating the risks in transactions that involve very expensive products or experience products.

Keywords: Trust, Credibility, Reputation, Information Asymmetry, Price Premiums, Feedback Mechanisms, Electronic Markets, Online Risks.

ISRL Categories: **AI0105, AI0104, AM01**

INTRODUCTION

In the past decade, there has been a rapid increase of online commercial activities enabled by the Internet. This revolution in the business world is due primarily to an explosion in Information Technology (IT) development and the resulting emergence of electronic commerce (Shaw, Gardner, and Thomas 1997).

Electronic commerce is a new form of online exchange where most transactions occur among entities that have never met before. As in traditional exchanges, trust has been considered crucial in the online transaction process (Ba, Whinston, and Zhang 1999, Brynjolfsson and Smith 2000), perhaps more so given the impersonal nature of the online environment. The lean nature of the electronic environment relative to the traditional face-to-face market leads to transaction risks such as identity uncertainty of online trading parties and product quality uncertainty. As manifested by the famous New Yorker cartoon that "on the Internet, no one knows you are a dog," online trading parties can easily remain anonymous or change their identities. For example, in the auction market where numerous individuals participate in transactions, it is very difficult to bind one identity to one trader. Most of the auction sites identify sellers or bidders by email addresses, which can be easily obtained without monetary cost from multiple sources. Without proper security measures (e.g., seller authentication), it is very easy for someone to masquerade as someone else, thus luring an unsuspecting buyer into a fraudulent transaction (Neumann 1997).

Product quality uncertainty arises when transacting parties do not have the same information about the product's quality. In the traditional business setting, people get to know the quality of products by "kicking the tires." But when bidders view a product listing at an online auction site, for example, they may not have easy access to information regarding the true

quality of the product, and therefore may be unable to judge product quality prior to purchase (Fung and Lee 1999). This difference between the amounts of information the two transacting parties possess is referred to as information asymmetry. The presence of risk inherent in online transactions arises from the spatial and temporal separation imposed by the medium (Brynjolfsson and Smith 2000). Buyers in online marketplaces have to rely on electronic information without having the ability to physically inspect the product; hence, they are vulnerable to additional risks because of potentially incomplete or distorted information provided by sellers (Lee 1998). Recognizing the difficulty of guaranteeing product quality, eBay excuses itself from the responsibility in its User Agreement by claiming that they "have no control over the quality, safety or legality of the items advertised, the truth or accuracy of the listings.[1]" Without a doubt, information asymmetry resulting from the impersonal nature of the online market exposes electronic market participants to more risks associated with fraudulent transactions.

Information asymmetry may give rise to opportunistic behavior such as misrepresentation of product quality, which could lead to mistrust or even market failure (Akerlof 1970). Therefore, opportunism could potentially erode the foundations of electronic markets and jeopardize the proliferation of the electronic economy. In an effort to reduce the number of fraudulent transactions, many online services have emerged, geared towards providing information on sellers' reputation, such as Bizrate.com, eBay's Feedback Forum and the product review site Epinions.com. Online feedback mechanisms allow buyers to publicize their transaction experiences with sellers by posting comments and rating the quality of the service

[1] Directly quoted from eBay's User Agreement: http://pages.ebay.com/help/basics/f-agreement.html.

provided by the sellers. The purpose is to help build trust in a potential trading party in an online community (Walden 2000).

Trust is a catalyst in many buyer-seller transactions, and it can provide buyers with high expectations of satisfying exchange relationships (Hawes, Kenneth and Swan 1989). Koller (1988) argues that trust is a function of the degree of risk inherent in a situation. Trust is especially critical when two situational factors are present in a transaction: uncertainty (risk) and incomplete product information (information asymmetry) (Swan and Nolan 1985). Many researchers have argued that trust is essential for understanding interpersonal behavior and economic exchanges (e.g. Doney and Cannon 1997, Eisenstadt 1986, Hirsch 1978, Shapiro 1987).

Despite the wide use of reputational mechanisms such as eBay's Feedback Forum to promote trust, so far there has been little empirical evidence as to whether online feedback mechanisms really induce trust and create any positive outcomes such as increased bidding prices from potential buyers. This study examines the extent to which trust can be induced by proper feedback mechanisms to complement electronic markets, and how some risk factors play a role in trust formation. Drawing from economic, marketing and sociological theories and using data from both an online experiment and an online auction market, we attempt to answer the following questions: a) Do appropriate feedback mechanisms induce trust in buyer-seller relationships by providing incentives and signals? b) How do positive and negative feedback ratings affect trust formation? c) Does trust promote price premiums? d) What are the moderating effects of certain risk-inducing product characteristics, such as being very expensive or being experience products, on the relationship between trust and price premiums?

The rest of the paper is structured as follows: Section 2 reviews the current literature on trust and how trust develops in an environment that involves potential risks. Section 3 presents a research model that examines the effects of feedback mechanisms and trust on a seller's performance in electronic transactions. Sections 4 and 5 present the methodology, results, hypothesis testing, and discussion for studies 1 and 2, respectively. Section 6 concludes by discussing the theoretical and managerial implications of this study, and offering suggestions for future research.

BACKGROUND ON TRUST

Most buyer-seller relationships are characterized by information asymmetry since the seller usually possesses more information than the buyer does about the quality of the product or the service (Mishra, Heide, and Cort 1998). The fact that buyers do not have complete information about sellers' actions creates the well-known problem of information asymmetry (Akerlof 1970), which may give rise to opportunistic behavior. Williamson (1985, p. 47) defines opportunism as "self-interest seeking with guile." In buyer-seller relationships, examples of opportunistic actions could be misrepresentation of the true characteristics of a product or service, incomplete disclosure of information, actual quality cheating, contract default, or failure to acknowledge warranties (Mishra et al. 1998). In online auctions, opportunism may take the form of unjustifiable delay in product delivery, misrepresentation of product characteristics, receiving payment without delivering a product, and other forms of illegal activity and fraud. Fears of such opportunistic behaviors could result in the buyers' mistrust in online products and services, jeopardizing electronic markets (Choi, Stahl, and Whinston 1997, Jarvenpaa and Tractinsky 1999, Jarvenpaa, Tractinsky, and Vitale 2000). To promote trust and reduce

opportunism in the electronic market, credible signals should be provided to differentiate among sellers and give them incentives to be trustworthy.

Following Gambetta (1988), Bhattacharya, Devinney, and Pillutla (1998), McKnight and Chervany (2000), we define trust as the subjective assessment of a party that another party will perform a particular transaction according to his or her confident expectations in an environment characterized by uncertainty. This definition captures two important attributes of trust: first, the confident expectation encompasses a possibility of a (mutually) beneficial outcome, and second, the uncertain environment suggests that delegation of authority from one party to another may have adverse (harmful) effects on the entrusting party. While trust could greatly improve the effectiveness of the market (Adler 2001), lack of trust in a market, particularly in one characterized by dishonesty and cheating, could, on the other hand, lead to market failure (Granovetter 1985).

----- Table 1: Sources of Trust -----

Three sources of trust are important in the business world (Williamson 1993, Coleman 1990): familiarity, calculativeness, and values (Table 1). Trust develops through interpersonal contact, reputation through a network of trusted third parties, and/or institutional rules. Familiarity or repeated interaction, which can lead to trust or mistrust, is not present in most one-time electronic transactions. Institutional rules in the online world are not yet well-developed (Fung and Lee 1999). Under the circumstances, currently the most prevalent source of trust in non-repeated exchanges is calculativeness: Trading parties form their trust perceptions based on a sober assessment (calculation) of the other party's costs and benefits of cooperating versus

cheating. Trust is an ongoing economic calculation whose value is derived by comparing the outcomes resulting from creating and sustaining the relationship to the costs of severing it (Dasgupta 1988, Hart and Saunders 1998, Williamson 1993). When agents have a reputation of being trustworthy, they can expect to receive benefits for their investment in reputation. In fact, calculative trust originates from the possible consequences of a negative reputation in most buyer-supplier relationships (Smeltzer 1997).

Literature shows a broad consensus that there are two distinct dimensions of trust: benevolence and credibility (Ganesan 1994, Doney and Cannon 1997) (Table 2). Credibility based trust expects that the other party can perform the job effectively and reliably, and will acknowledge contracts and fulfill implicit and explicit requirements of an agreement. It is usually impersonal and built on reputation or calculativeness (economic rationale). The academic literature has predominantly focused on benevolence (also referred to as goodwill trust by Sako (1992)) based on repeated buyer-seller relationships (Ring and Van de Ven 1992, Zaheer, McEvily, and Perrone 1998), and mostly treated trust as a unidimensional construct (Geyskens et al. 1998). Regardless of this focus, Ganesan (1994) investigated the two dimensions of trust independently and concluded that these two dimensions did demonstrate different relationships with other variables.

----- Table 2: Dimensions of Trust -----

Benevolence does not readily apply to the context of this study since it requires familiarity and prior interaction, whereas the online auction market is characterized by one-time transactions – Resnick and Zeckhauser (2001) report that during their five-month eBay data

collection period, 89.0% of all seller-buyer pairs conducted just one transaction, and 98.9% conducted no more than four. Many buyers and sellers are new entrants to the marketplace without established brand name or recognition. Consequently, this paper investigates the credibility type of trust, which originates from a subjective calculation of the costs and benefits of cheating to the other party, based on the other party's reputation perceived by a network of third parties.

CONCEPTUAL DEVELOPMENT

An important part of any transaction model is feedback, described by Schramm (1973, p. 51) as creating an opportunity to react quickly to signs that have been put out by others. Given the risk inherent in online auctions, different trust promoting mechanisms such as feedback mechanisms have been proposed and adapted by practitioners. What kind of role does trust play in online auctions? Do feedback mechanisms lead to higher auction prices? In this section, we will develop a model to explain the mitigating effect of trust on the relationship between feedback mechanisms and price premiums. In addition, we will also explore how certain risk-inducing product characteristics, such as price and experience attributes, affect trust formation.

Feedback Mechanism

Feedback mechanisms are currently widely used in online auctions, one example being eBay's Feedback Forum, a place where users leave comments about each other's buying and selling experiences at eBay. They are a market signaling mechanism in a world with uncertainty and risk. These systems accumulate and disseminate feedback about past trading behaviors of buyers and sellers, helping the system's users to decide whom to trust and discouraging

opportunistic behaviors. Feedback mechanisms are based on game theory analysis which indicates that self-interested agents tend to cooperate given higher payoffs from cooperation than from cheating. An incentive for cooperation is more likely to occur with repeated transactions over an infinite time horizon rather than one-time transactions (Kreps 1990). In one-time transactions, self-interested, profit-maximizing agents have incentives to cheat. However, by introducing an appropriate feedback mechanism, each agent is transformed into a long-term player whose behavior has reputational consequences. Buyers are informed about the past behavior of all available sellers, and they are able to choose. Hence, it is presupposed that for all sellers, the probability of finding a buyer depends on their past behavior. On the basis of this dependency, only cooperative conduct pays in the long run; hence, rational sellers tend to act in a trustworthy manner. The possible sanctions from buyers resulting from a bad reputation discourage dishonest and opportunistic behaviors. The trust-building process therefore is driven by the buyer's calculation that the costs of the seller acting in an untrustworthy manner exceed the benefits of such actions. In short, from economics theory, good feedback will lead buyers to trust sellers; not only does good feedback provide a signal of trustworthiness to potential buyers, but sellers also have incentives to guard their good feedback profile.

Feedback usually consists of positive as well as negative ratings. The interesting issue here is what role these different ratings play in a buyer's trust formation. According to Sundaram and Webster (1998), negative messages have a detrimental effect on unfamiliar brands. Lee, Im, and Lee (2000) report that higher negative feedback ratings lead to lower bidding prices in Internet auctions. Given that most sellers have not established any name recognition, negative feedback is likely to have a very strong negative effect on a buyer' trust perceptions, which is most likely to supersede the effect of positive feedback.

Negative Rating Hypothesis (H1): Negative ratings have a greater opposing weight than positive ratings in building buyers' trust perceptions of the seller's credibility.

Following the same argument, buyers would eminently value a long and unblemished rating profile, since a more reputable seller is less likely to destroy a good name to exploit a single transaction (Scott and Derlaga 1983). The trust is therefore a calculus-based trust: assuming that reputable sellers incur a higher cost from cheating behaviors, they are less likely to act opportunistically.

Positive Rating Hypothesis (H2): A greater number of positive ratings induces stronger buyers' trust in the seller's credibility when there is no negative feedback.

Price Premiums

The economics literature defines price premiums as the high prices that lead to above-average profits (Klein and Leffler 1981, Shapiro 1983). In this context, we define price premium as the monetary amount above the average price received by multiple sellers for a certain matching product. It is crucial to clarify that price premiums do not imply that auction sellers receive higher prices than from other selling channels. As a matter of fact, Kauffman and Wood (2000) show that prices in Internet auctions are significantly lower than standard retail values. The conceptualization of price premiums is solely formulated to depict the variance in final prices that sellers receive for perfectly comparable products. A major reason for the existence of price premiums is the need to compensate for reducing transaction risks (Rao and Monroe 1996). Therefore, in an efficient market mechanism or a dynamic pricing scheme, we argue that buyers are willing to compensate reputable sellers with price premiums to assure safe transactions. On

the other hand, price discount is the monetary amount below the average price, which exists to compensate buyers for assuming above average transaction-specific risks. Buyers tend to demand compensation for the risk they are exposed to when they transact with less reputable sellers. Consequently, differences in perceived reputation and credibility cause price premiums and discounts. Based on this argument, buyers' trust in a seller's credibility helps reducing perceived transaction-specific risks, allowing sellers to obtain price premiums.

Price Premium Hypothesis (H3): Higher trust in the seller's credibility results in higher price premiums for an identical product or service.

Product Prices

As elaborated earlier, price premiums may be viewed as compensation for sellers for promoting trust by reducing transaction risks in an uncertain environment. On the other hand, price discounts are viewed as compensation for buyers for bearing higher than average risk. Therefore, transactions involving more risky products should result in higher price premiums for reputable sellers. For example, a transaction involving an expensive product such as a $1200 camcorder would be considered more risky than that involving a $15 CD. The more expensive a product is, the lower incentives the seller has to cooperate since the benefits of cheating are greater, and the higher the maximum potential for loss a buyer faces. In our research context, whether a product is considered expensive or not is determined by its market price. Given the greater risk inherent in the exchange of expensive products, buyers would seek more trustworthy sellers to conduct business with. According to Wedow (1979), if risk is high, trust becomes a precondition for sales. Therefore, trust becomes increasingly more important in risky transactions involving expensive items, resulting in pronounced price premiums. Consequently,

how expensive a product is should have a moderating effect on the relationship between trust and price premiums.

Expensive Product Hypothesis (H4): The relationship between trust and price premiums is stronger for expensive products than for inexpensive products.

Experience Products

According to Nelson (1970), there are two types of products: search products and experience products. Search products are those whose quality can be adequately assessed prior to purchase, while experience goods are those whose quality is assessed only after purchase. Wright and Lynch (1995) argue that all products have simultaneously both experience and search attributes. Valid search attribute information can be gained from second hand sources such as advertising, whereas products with more experience attributes, on the other hand, allow room for more opportunism since there is a greater degree of information asymmetry between the seller and the buyer. The buyer normally perceives a far less reliable link between the information available before use and the benefits or outcomes experienced later. In the online market the customer cannot physically inspect the product, but instead has to rely on images and observable product characteristics, which entails a loss of information about product attributes. According to Koppius, Van Heck, and Wolters (1998), this reliance leads buyers to compensate for the loss by placing greater emphasis on seller's reputation in determining their bids. The economics and marketing literature suggest that the reputation effect is likely to be particularly important for experience goods (Langdon and Smith 1998, Rao and Bergen 1992). Therefore, risks are higher for transactions involving products whose attributes can be evaluated only after purchase and

use. Consequently, the experience attributes of a product should also have a moderating effect on the relationship between trust and price premiums.

Experience Product Hypothesis (H5): The relationship between trust and price premiums is stronger for products with more experience attributes than for those with more search attributes.

Figure 1 presents the research model for the study. In summary, the model hypothesizes that buyers' trust in the sellers' credibility, based on the sellers' feedback profiles as reflected in a feedback mechanism, affects their willingness to pay a price premium. In addition, the willingness to pay a price premium is also contingent upon the characteristics of the product, such as how expensive a product is and whether the product is an experience product.

----- Figure 1: Research Model -----

MOTIVATIONS FOR USING AUCTION MARKETS

This study employs online auction markets to test the proposed hypotheses. Online auctions have a number of characteristics that make them particularly suitable for examining the research model in this paper. First, online auctions have been extremely popular with many competing buyers and sellers, and many products available. One of the most popular auction marketplaces – eBay.com – was selected to ensure a high number of transacting parties and products. Second, most sellers in online auction markets have not established name recognition, nor have they formed long-term ongoing relationships (Resnick and Zeckhauser 2001). Therefore, we can safely assume that brand names and familiarity (benevolence or goodwill) trust are absent from these markets. Third, despite some norms and regulations, there are no

well-established institutional rules and contracts to govern online transactions, which gives rise to opportunism. Fourth, the feedback mechanism available in eBay – the Feedback Forum – though not ideal, possesses most characteristics of a credible reputation mechanism (Resnick et al. 2000). Finally, auctions provide a dynamic pricing mechanism that allows final prices to be determined by the buyer. Therefore, buyers are able to compensate reputable sellers with price premiums or punish dishonest sellers with price discounts, rather than rely on posted prices.

To adequately address the research model in figure 1, we conducted two studies: the first study is an online experiment that allows us to explicitly measure trust by manipulating feedback profiles and product type. The second study uses field data to externally validate the experimental results, which might suffer from the constraint that they do not involve actual monetary transactions.

STUDY 1: ONLINE FIELD EXPERIMENT

Study 1 uses an online field experiment to explore the existence of trust and price premiums in online auction markets resulting from various combinations of feedback profiles. In addition, the study also examines the moderating effect of product attributes on the relationship between trust and price premiums by varying product price and product type.

Experimental Tasks

An online experiment was posted at our research lab's web site where five different feedback profiles were constructed by varying the number of positive and negative ratings in a format similar to the well-established online auction market eBay. The participants were first presented with a web page where four different product descriptions were listed, each taken from

a real eBay auction. They were asked their opinions on whether they felt they could adequately evaluate the products before purchase. The purpose was to validate the product type assumptions we had made on each product.

Upon hitting the submit button when they were done with this page, they were presented with another page that described all five sellers' feedback profiles (randomly listed), each followed by the same four products listed in the previous page, and they were asked to indicate how much they trusted each seller and to provide the maximum bid they were willing to give on each product associated with each seller. The participants' assessment of each seller's trustworthiness was based on their own impressions of the feedback profiles. The feedback profiles, i.e., the number of positive and negative ratings, were controlled to reflect different levels of feedback. However, we did not provide specific "feedback comments" beyond the overall "positive" or "negative" rating. Post-experimental questions could not be posed to the eBay users in the field experiments because of difficulty in contacting users for non-auction related inquiries.

Procedures

In order to construct meaningful and realistic feedback profiles, we examined 937 eBay actual seller profiles. The results show that the average seller has a mean of 172 feedback comments (std. dev.=300), with 170 positive and 2 negative responses. Therefore, the ratio of positive to total responses has a mean of approximately 99%. Based on the above information, seller profiles were constructed to reflect the typical profiles in eBay's Feedback Forum: a long selling history at eBay would suggest approximately 470 responses, and a short selling history would consist of about 33 responses. Similarly, the ratio of positive comments to total ratings

was classified as high (100%) or low (92%). Consequently, four of the profiles were $S_{445,0}$, $S_{33,0}$, $S_{34,3}$, and $S_{447,39}$, where S is seller and the first subscript refers to the number of positive ratings and the second the number of negative ratings. Finally, a control profile was constructed with neither positive nor negative ratings ($S_{0,0}$), which consists of about 10% of the 937 sample profiles we examined.

Four products were selected for the experiment that varied in terms of their average price across many completed auctions (see Study 2) and their product type. The bases for selecting these items were first, the difference in price ($1,200 versus $15), and second the differences in a product's experience attributes. The experience attribute distinction was based on the theoretical argument made by Wright and Lynch (1995): everybody knows how a CD works but the user friendliness of a camcorder or the actual download speed of a computer modem can be assessed only after use. Therefore, a music CD and the Windows server software CD were included as products with mostly search attributes, whereas a Canon digital camcorder, and a sophisticated computer modem (Motorola 56K PCI Speakerphone Modem) were considered to be products with mostly experience attributes.

The experiment was pre-tested in two phases. At the initial phase, four subjects completed the experiment in the presence of one of the authors. All four subjects are graduate students who have experience with the Internet and understood how an online auction works without any explanation from the authors. They commented on every item and justified their answers. Post-experimental inquiries assessed whether these subjects guessed the study's purpose and true hypotheses. Their responses did not suggest that they had faithfully captured the research hypotheses, rendering support that there was no significant demand bias in this

experiment (Page 1973). Feedback from this phase determined the format of the design and the questionnaire of the experiment.

The subjects were also asked to justify their ratings on how they perceived whether they could evaluate a product before seeing the product. The consensus emerging from the justifications reported that buying music and software CDs was a simple decision: everybody knew what a CD was and how it worked. On the other hand, electronics and computer equipment have an experience component since their qualities, functionality, or ergonomics are more difficult to be fully evaluated prior to purchase or their features are more incommensurable. In addition, the longevity of electronics and computer equipment was suggested as important by the subjects, whereas the issue of longevity was trivial for the CDs. Therefore, electronics and computer equipment bear more experience attributes than search attributes.

The conceptual distinction of the product attribute variations was further confirmed in a follow-up test with 50 undergraduate students where they were requested to respond to the item "The quality of this product can be adequately evaluated before purchase," using a 9-point scale for each of eighteen products. These products belong to five popular e-commerce categories according to a study conducted by Georgia Institute of Technology in 1998 (http://www.gvu.gatech.edu/user_surveys/): music CDs, software CDs, video games, hardware, and electronics. A scale 1 rating means that the product has a strong experience attribute, whereas a scale 9 rating indicates that the product bears a strong search attribute. This item, adapted from Rao and Bergen (1992), was appropriate because it allowed respondents to specify the degree to which a product was perceived to be a search or an experience product.

Based on the justifications we received from the four graduate students in the pretest, we grouped music CDs, software CDs, and video games into products with more search attributes,

and hardware and electronics into products with more experience attributes. A two-sample T-test indicates that the two group means are significantly different ($t=4.89$, $p<.001$), supporting our theoretical categorization of the four products we selected for the experiment.

The experiment was then further pre-tested with actual eBay users. An e-mail invitation was sent to a random sample of 60 eBay users, asking them to visit the web site and participate in the experiment. A field at the end of the questionnaire allowed them to post their comments and suggestions. Seven users participated, and based on their suggestions, the experiment was considerably shortened.

Before sending actual e-mail invitations, an e-mail notice was sent to 414 eBay users. These users were randomly selected from eBay users who had completed at least 5 transactions. The reason for selecting users with some experience was twofold: first, the interview-based pretest indicated that users with some auction experience found it easier to understand and complete the experiment compared to users with minimal exposure to auctions. Second, recurrent auction participants are likely to be more interested in participating in an auction-related experiment, thus increasing the response rate. The e-mail notice informed them of the purpose of the study and asked them to reply if they did not want to participate. Twenty-one users replied and expressed their unwillingness to participate, leaving 393 users who received an e-mail instructing them how to access the web site and participate in this experiment. The invitees were informed that the goal of the survey was to understand the concepts of reputation and trust in online auction markets, and they were assured that the results would be reported in aggregate to guarantee their anonymity. To motivate individuals to respond, they were offered an incentive in the form of a report that summarizes the results of the experiment, and a $100 lottery

to be drawn among all participants. In addition, we compiled for the participants many resources about online auctions to encourage participation.

Measures

Scales to measure each of the factors in the model were developed based on previous literature and existing scales were used where possible. In particular, measures of trust based on credibility were adapted from Ganesan (1994), and were also based on the description proposed by Sako (1992) and Sako and Helper (1998), who measured different types of trust between buyers and suppliers. Participants were asked to fill in a three-item, nine-point Likert-type scale measuring trust in the seller's credibility.

Similar to the pretest on product type, participants were asked to indicate the product type of each of the four products using a 9-point scale. Manipulation checks were done by two paired t-tests to examine the differences between the two expensive items in terms of product type (camcorder=5.6 and software=7.9), and between the two inexpensive items (modem=4.6 and CD=7.0). For the expensive items ($1,200), there was significant difference between experience and search goods ($t=-3.47$, $p=.001$), and for the inexpensive items the difference was also significant ($t=-3.59$, $p=.001$). Our categorization of the products is therefore justified.

Response Rate and Nonresponse Bias. Ninety-five out of 393 responses were received for an effective response rate of 24%. All responses were received within one week from the day the invitation was sent, and more than half (53%) of the participants completed the experiment in the first day. The response rate is considered high compared to similar studies, mainly because the invitees were interested in the experiment. In fact, 81% of the respondents requested the results of the study.

To investigate whether nonresponse bias was an issue, t-tests were conducted to examine differences between early and late respondents (Armstrong and Overton 1976, Heide and Weiss 1995). On the basis of these tests, the null hypothesis of equal means across the early (n=50) and late (n=45) (received after the first day) respondents could not be rejected. Tests were conducted with respect to "Age" (t=1.17, p=.25), "Sex" (t=1.54, p=.13), and "Income" (t=1.34, p=.19). Further evidence of the lack of nonresponse bias was provided from the results of t-tests that compared the responding sample (n=95) with an overall sample of Internet users based on a survey (n=5,022) conducted by the Graphics, Visualization & Usability (GVU) Center at the Georgia Institute of Technology in 1998 (http://www.gvu.gatech.edu/user_surveys/). Similarly, we could not reject the null hypothesis of equal means across these two groups for "Age" (t=0.7, p=.48), "Sex" (t=1.04, p=.3), and "Income" (t=1.25, p=.21). Moreover, respondents indicated their residence to be in 24 American states, suggesting a scattered sample. In short, nonresponse bias does not seem to be a major concern in this study.

Two methods for assessing discriminant validity were used. First, exploratory factor analyses were conducted using orthogonal (varimax) rotation to ensure high loadings on hypothesized factors and low cross-loadings. Second, all eigenvalues associated with the factors were set to be greater than unity, and the seven items in the questionnaire were reduced to two principal constructs (trust and price premiums). All items loaded on their hypothesized factors, and the estimates were positive and significant, which provides evidence of convergent validity (Bagozzi and Yi 1988). The factor solution for trust is shown in Table 3. The overall factor solution has an acceptable loading pattern and explains 86% of the variation. Therefore, the statistics support construct validity in this study. Moreover, reliability analysis of these two scales shows a Cronbach's alpha of 0.98 for trust, and 0.82 for price premiums. These reliability

values are well above the value of 0.7 that was suggested by Nunnally (1978) for basic research. Therefore, the items corresponding to each variable could be averaged to create an overall measure for each variable.

----- Table 3: Measurement instrument and relevant statistics -----

Results

Testing of the Structural Model

The descriptive statistics about the trust levels for the five seller profiles, their means, and the standard deviations (in parentheses), as well as price premiums for the four different products and their means are shown in Table 4.

----- Table 4: Descriptive statistics of trust and price premiums -----

In order to examine the effect of feedback profiles (i.e., positive and negative ratings) on trust perceptions, multivariate regression analysis was performed with trust as the dependent variable. The independent variables were the logarithm of the number of positive ratings (PR) and negative ratings (NR), adding 1 to avoid the possibility of taking the log of 0. The logarithmic transformation was used because we believe trust is a concave function of the number of positive ratings, that is, when a seller already has many positive ratings, the marginal benefit of an additional positive rating should not be as big as that for a seller who has no or very few positive ratings. With the same reasoning, trust is a convex function of the number of

negative ratings. The variable trust was normalized by removing the corresponding mean from each value and dividing it by its standard deviation.

----- Table 5: Correlation Matrix -----

Table 5 displays the correlation matrix. The correlation between positive ratings and negative ratings seem high. Therefore, the regression also included a formal multicollinearity test. Table 6 shows the results of this regression. A multicollinearity diagnostic returns a tolerance value of .76, well above the common cutoff threshold of .10 (Hair et al. 1998), indicating that multicollinearity is not a concern.

----- Table 6: Multivariate regression analysis for trust in seller's credibility -----

From Table 6, we can see that the multivariate regression shows a relatively high R^2 (0.57) and both positive and negative ratings determine the formation of a buyer's trust in a seller, with negative ratings having an opposing effect. The coefficients of regression indicate a higher weight for negative (b_2=-.856) compared to positive (b_1=.541) ratings. A t-test was performed to compare the weight of the negative versus the positive ratings and the result indicates that the coefficient of regression for negative ratings was significantly higher than the positive rating coefficient (t-value=6.15, p<.000). This supports the negative rating hypothesis (H1) that negative ratings have a greater opposing effect than the positive ratings when a buyer forms his level of trust in a seller's credibility based on feedback information.

To check how a feedback profile with only positive ratings affects a buyer's trust formation, we compared the three profiles without negative ratings ($S_{0,0}$, $S_{33,0}$, and $S_{445,0}$). The mean level of trust for the three different sellers is 5.3, 7.6, and 8.4, respectively. An analysis of variance indicates that the between group means are significantly different from each other ($F=175.9$, $p<.000$). In addition, since the means for seller $S_{33,0}$ and seller $S_{445,0}$ are close, we performed a paired-samples t-test to compare these two means. The result indicates that these two means are also significantly different ($t=8.226$, $p<.000$). All of the above support the positive rating hypothesis (H2) that when there is no negative rating, a greater number of positive ratings induces a higher level of trust in the seller's credibility.

To examine the relationship between a buyer's trust level in a particular seller and the price premium the buyer is willing to pay for the seller's product, regression analysis was performed with the normalized values of trust as the independent variable, and the normalized price premiums as the dependent variable. The results for the four different products and their means are shown in Table 7. Since regression analysis was performed on normalized values, the standardized coefficient of regression was equal to the correlation between trust and price premiums. All coefficients were significant ($p<.000$) and positive, demonstrating the effect trust has on price premiums. Therefore the price premium hypothesis (H3) is supported.

----- Table 7: Regression results between trust and price premium by product -----

Since feedback induces trust in the seller's credibility, and, in turn, trust affects price premiums, a counter argument would suggest that trust does not mediate the relationship

between feedback and price premiums. To examine the correctness of our model that trust does mediate the relationship, a series of regression models were tested (Baron and Kenny 1986):

$$Trust = \beta_0 + \beta_1 \cdot Log(PR) + \beta_2 \cdot Log(NR) + \varepsilon \quad (1)$$

$$PP = \beta_0 + \beta_1 \cdot Log(PR) + \beta_2 \cdot Log(NR) + \varepsilon \quad (2)$$

$$PP = \beta_0 + \beta_1 \cdot Log(PR) + \beta_2 \cdot Log(NR) + \beta_3 \cdot Trust + \varepsilon \quad (3)$$

Table 8 indicates that all the coefficients are significant, satisfying the conditions needed to establish mediation (Baron and Kenny 1986). That is, trust indeed mediates the relationship between feedback profile and price premiums, although the effect is not complete mediation.

----- Table 8. Testing the mediating effect of trust -----

Testing of the Moderators

We hypothesized that product price and product type would moderate the relationship between trust and price premiums. To test these hypotheses, we included two additional variables: product price and product type. The variable "product price" is the actual retail price of the product. The variable "product type" was measured on a 1 to 9 scale for a product's experience attribute based on the pretest. The moderated regression analysis technique was used (Sharma, Durand, and Gurarie 1981). In other words, the following regressions were performed:

$$PP = \beta_0 + \beta_1 \cdot Trust + \varepsilon \quad (4)$$

$$PP = \beta_0 + \beta_1 \cdot Trust + \beta_2 \cdot Type + \beta_3 \cdot \mathrm{Pr}ice + \varepsilon \quad (5)$$

$$PP = \beta_0 + \beta_1 \cdot Trust + \beta_2 \cdot Type + \beta_3 \cdot \mathrm{Pr}ice + \beta_4 \cdot Trust \cdot Type + \beta_5 \cdot Trust \cdot \mathrm{Pr}ice + \varepsilon \quad (6)$$

----- Table 9: Regression results with the moderating variables for study 1 -----

Table 9 shows that both product price and a product's experience attribute are shown to be pure moderators, indicating that the relationship between trust and price premiums is contingent upon product price and product type. Thus hypothesis 4 and 5 are supported. Figure 2a demonstrates the moderating effect of product price. It is a plot for expensive as well as inexpensive products, holding product type constant. The results reveal that at a lower level of trust, buyers demand a greater price discount for expensive products than for inexpensive products (a negative price premium means price discount). When trust reaches a rather high level (7.2 on a 9-point scale), they appear to be willing to pay a higher price premium for expensive products. For inexpensive products, however, the relationship between trust and price premiums is not as strong and pronounced. Even at a very high level of trust, buyers still would not be willing to pay a high price premium. Figure 2b illustrates the moderating effect of a product's experience attribute – the higher the trust level, the more a buyer is willing to pay for experience products.

----- Figure 2: The moderating effect of product price and product type on the relationship between trust and price premiums -----

Discussion

As with all experimental studies, this field experiment may potentially suffer from demand bias, especially since it was performed outside the laboratory where the experimenters had limited control over the participants' behavior (Shimp, Hyatt, and Snyder 1991). In order to reduce the effect of demand bias, several precautions had been taken following the recommendations of Sawyer (1975) and Greenberg and Folger (1988). First, we used natural surroundings to conduct the experiment, replicating eBay's auction interface to the extent

possible. Second, we provided very little information about the intent of the study in the experiment's instructions and questionnaire items. In doing so, we minimized potential demand cues that might have alerted the participants to our research objectives. Third, we used a form of deception by providing two different web pages and asking the most important questions in the second page, thus diverting the subjects from understanding the study's objectives. These precautions seemed to distract the four participants in the pretest where nobody managed to infer the study's true hypotheses in a post-experimental inquiry. In general, given that demand bias is almost impossible to diminish completely, we are confident that our methods have reduced demand bias to a degree that the study's findings are not affected.

A main limitation of the study is that we manipulated feedback only through the number of positive and negative feedback ratings in order to avoid highly subjective inferences. Nevertheless, many feedback mechanisms, including eBay's Feedback Forum, also provide a section for comments where buyers can explain the reasoning behind their rating. Much of the information about sellers is available in these comments; for example, a negative rating might suggest either simply a delay in the delivery, or a misrepresentation of product characteristics, or even receiving payment without delivering a product. Therefore, comments would be an important complement to this study. In fact, some participants suggested that comments about sellers would be extremely helpful in determining their trust perceptions.

In summary, this study is an attempt to examine from the seller's side whether it is rewarding to establish a good reputation and to highlight the importance of trust in buyer behavior. Our analyses indicate that all the five hypotheses are supported. However, what is interesting is whether a good feedback profile really converts into price premiums in a real auction setting. Critics of experimental work argue that external validity is not preserved in this

type of study, inferring that real world phenomena are not captured by an experiment. In line with this argument, differences in feedback ratings might not generate price premiums in actual market settings. In addition, the experiment collected data from the buyer's perspective, that is, how does a buyer valuate a particular seller's product? These valuations may not necessarily convert into price premiums or price discounts in an auction since in a real auction setting, what matters is the final winning price, not the collective valuations of all potential buyers. In fact, empirical evidence has shown conflicting results regarding the effectiveness of these systems in real online environments (Kauffman and Wood 2000, Lee et al. 2000). Therefore, a good feedback profile may not translate into price premiums at all – there may always be some buyer who doesn't care about the feedback profiles. Examining the feedback-price premiums relationship in a real auction market thus seems particularly important. Study 2 is designed to address this issue.

STUDY 2: FIELD DATA FROM EBAY.COM

Study 2 used field data to examine whether a good feedback profile leads to actual higher price premiums. In addition, the moderating effects of product price and product type (i.e., a product's experience attribute) were also evaluated using field data.

Method

Data were collected from eBay's Feedback Forum. This Forum allows buyers to leave comments about sellers they have transacted with, and rate them as positive, negative, or neutral. From January 25 to March 10, 2000, we collected data from 682 completed auctions for 18 different products. Data included the final winning auction price and the feedback profile of each

seller. All products were examined to be identical to avoid price differences for product-related variations, such as differences in brand names. Two researchers examined these products descriptions to make sure that they are identical, comparable products – all products are brand new, sealed, and not refurbished. Completed auctions whose products did not clearly possess these characteristics were discarded from the sample.

Since we didn't have a direct measure of trust in the eBay data, the research model in figure 1 had to be modified - instead of testing the relationship between trust and price premiums, we tested in Study 2 the direct relationship between feedback profiles and price premiums, plus the moderating effects of product price and product type on that relationship. That is, H1, H2, H4, and H5 were correspondingly modified, using feedback profile as a proxy for trust.

To test the relationships between feedback ratings (positive ratings and negative ratings) and price premium, multivariate regression analysis was performed for each product, with the independent variables being the logarithm of the number of positive and negative ratings, consistent with Study 1. The dependent variable was the price premium developed by subtracting the mean price from the final price of each product divided by its mean price.

$$PP = \beta_0 + \beta_1 \cdot Log(PR) + \beta_2 \cdot Log(NR) + \varepsilon$$

The moderated regression analysis technique was again used to test the moderating effect of product type and product price, with the interaction terms *Log(PR)*Type*, *Log(PR)*Price*, *Log(NR)*Type*, and *Log(NR)*Price*. Product price was operationalized as the average price of each product across all completed auctions. In order to provide a score for product type for all eighteen products, the results from the product pretest were employed, each product receiving the average score given by the 50 subjects in the pretest of Study 1. To summarize, computer

hardware and electronics were considered to have more experience attributes because of the importance of their "user friendliness" component, whereas software, music, and video games were considered to have more search attributes.

Results

Table 10 shows the descriptive statistics of all eighteen products in terms of their prices and product type scores.

----- Table 10: Descriptive statistics of the mean and standard deviation of each product's auction winning price and product type -----

According to the results of Study 1, we expected to find that more positive ratings would lead to higher price premiums, whereas negative ratings would have a stronger opposite effect. The relationship between feedback profiles and price premiums should also be stronger for expensive products and products that bear more experience attributes.

Table 11 presents the regression results between feedback profile and price premiums for all eighteen products. Regression analysis found significant correlation between positive ratings and price premiums for 13 out of the 18 products. This provides evidence that buyers do take into account reputational indicators such as a seller's feedback rating and do reward trustworthy sellers with price premiums. Therefore, field data provide support for our theoretical argument that better feedback profiles induce higher trust which in turn leads to higher price premiums, confirming H2 in the research model. However, contrary to our expectation theorized in H1, negative ratings only had a significant negative impact in two of the tests.

----- Table 11: Multivariate regression analysis by product -----

Table 12 shows the results of the moderated regression analysis which indicate that product price acts as a moderator on the relationship between negative ratings and price premiums. This finding is consistent with Study 1 – negative ratings have a negative impact on trust. Therefore, product price has a negative impact on the relationship between negative ratings and price premiums. However, the tests failed to show any effect of product type and price on the relationship between the positive ratings and price premium.

----- Table 12: Moderated regression analysis results for study 2 ----

Discussion

Study 2 was carried out in a real-life environment in which actual buyers generate price premiums as a result of differences in feedback profiles. Moreover, real-life transaction-specific risks incurred by certain product characteristics are reflected in this study, addressing the limitation associated with Study 1 that is inherent in any experimental studies. The price premiums in Study 2 are measured from the market's perspective, that is, the materialized value the sellers actually received, instead of what buyers are willing to pay without the element of dynamic pricing. The finding that sellers with stellar reputations receive price premiums has also been observed in auctions of coins (Lucking-Reiley et al. 2000) and computer equipment (Houser and Wooders 2000). Our study examines a greater number of products compared to previous studies, and it also attempts to make theoretical inferences about the moderating roles of product prices and a product's experience attributes.

A major limitation of Study 2 was the use of secondary data, which did not allow us to measure trust perceptions. Moreover, the manipulation of product type was based on the limited results of the previous experiment, our conceptual distinction between experience and search products, and the input received from the pretest. Therefore, unlike Study 1, the procedure described in Study 2 does not allow us to perform manipulation checks to determine how users perceived the products based on their experience attributes.

Another limitation of this study is that the written comments, which accompanied sellers' ratings, were not evaluated and used in assessing the degree of price premiums. Buyers' comments do offer notable information that cannot be captured by simple ratings. There is a significant difference between a negative comment suggesting a delay as opposed to fraud. More careful analysis of written comments may reveal new information about the role of feedback mechanisms. For example, detailed comments may suggest that other dimensions of trust (e.g. benevolence as opposed to credibility) are at play. However, the amount of subjectivity involved in the process of analyzing such comments and the huge number of comments for each of the 682 sellers (mean=172 comments) prevented such an evaluation. Future research could analyze the role of written comments in determining trust and price premiums and specify the importance of comments as opposed to simple ratings.

IMPLICATIONS AND CONCLUSION

The primary contribution of this research is that a set of interrelationships between important factors that tend to be associated with trust and trust building technologies in electronic markets was specified. The results from the two studies provide substantial support for the research model in Figure 1. Our framework proposes several important considerations for the

mediating role of trust in electronic markets. Another contribution of this research is the analysis of the credibility dimension of trust. While the extant literature has paid particular attention to benevolence as the most important dimension of trust, this research shows that in online transactions, the dimension of credibility is also a very important predictor of positive economic outcomes. In fact, our results broadly support the thesis that positive economic outcomes such as increased price premiums have a considerable portion of its basis on trust in sellers' credibility. Therefore, this dimension of trust undoubtedly commands further research effort with regard to its role in electronic markets, and encourages investigation of the relationship between the impersonal view of trust (i.e., credibility) and the familiarity-based trust (i.e., benevolence).

Key Findings

This research is one of the first to address the importance of impersonal trust in online transactions from the consumers' point of view. Our hypotheses are largely supported and suggest that a seller's reputation, reflected through his feedback profile, plays a very important role in buyers' trust building process.

To answer the research questions raised in the introduction, we summarize the key results from the two studies in Table 13. The results confirm that buyers develop trust in sellers' credibility partly as a result of feedback mechanisms, and trust has a substantial effect on the transaction by generating price premiums. The research model is strengthened by the presence of variables that moderate the interrelationships and provides evidence that more risky transactions are likely to generate more pronounced price premiums for reputable sellers. Expensive products and products with more experience attributes are believed to have higher

transaction-specific risks because the seller has higher incentives to cheat or there is a greater degree of information asymmetry between the buyer and the seller.

----- Table 13: The key findings of the studies -----

A surprising difference between the two studies is the effect of negative ratings: contrary to our theoretical argument and the result of previous studies (Lee et al. 2000), negative ratings didn't show much impact on price premiums in the eBay data. In fact, the only time negative ratings were significant was when expensive products were involved in the transactions. We believe that the difference between our study and the study of Lee et al. is the result of product selection: our study included only brand new products, whereas the other study also included used and refurbished products. When a product is used or refurbished, the quality variance might increase significantly, which means that the risk level for the buyer also increases. Negative ratings in this case would weigh more heavily as opposed to when a brand new product is involved.

In addition, several other reasons might contribute to the result of negative ratings not being significant. First, our study examined only completed auctions. Auctions run by sellers with many negative ratings tend not to be completed (they do not receive bids). Therefore, although these sellers essentially obtained a great price discount (by not receiving any bids at all), our sample did not capture these incomplete auctions. Second, from a statistical point of view, given the small number of negative ratings compared to the total (1%), their effect might not be as detrimental as we originally theorized. The much greater number of positive ratings might simply supersede the effect of negative ratings and reduce their damaging potential. It's

worth pointing out that eBay strongly encourages buyers to negotiate and try to work out their problems before resorting to leaving negative comments. Hence, these efforts reduce the actual number and impact of negative ratings in real-world auctions. Finally, when a seller receives a high number of negative ratings, eBay prevents the seller from selling at the site. Therefore, the vast majority of sellers do have very good ratings. Indeed, it is possible that there is a threshold level for negative ratings (in other words, a tolerance level from buyers) under which buyers do not mind doing transactions with the seller. To summarize, both studies indicate that positive ratings have a strong impact on price premiums. However, the effect of negative ratings is not conclusive.

Another difference between the two studies is the role of product type. While it was significant in the experimental study, it failed to show any impact on the relationship between feedback profiles and price premiums in the eBay data. Conceptually, experience products have more inherent risk because of information asymmetry. The 18 products we chose to include in the study, however, were standard products with low variance. The products categorized as experience products might be viewed as search products, depending on the knowledge level of the buyers, resulting in different views about whether they can adequately judge the product before purchase. In fact, one might consider all of them as search products, with some bearing more experience attributes than others. The categorization is indeed a subjective one. In looking for exactly identical items, we might have lost out on data for collectible items, which would truly qualify as experience goods. While we still believe that a product's experience attribute plays a role in the relationship between feedback profiles and price premiums, further studies are needed to examine a wide variety of products that bears different degrees of experience attributes.

Theoretical Implications

Our conclusions are in agreement with the findings of Lee (1998), who examined the electronic auction marketplace AUCNet for used cars in Japan. Both papers address the issue of increased quality uncertainty and risk associated with online transactions. Lee focuses on uncertainty regarding product quality, whereas we examine uncertainty related to seller credibility. Both forms of uncertainty have a similar negative impact on the buyer's expected utility. Vehicle quality uncertainty in AUCNet is addressed by an accreditation mechanism where AUCNet mechanics inspect all vehicles and provide a rating. While accreditation may be regarded as a viable trust-building mechanism that reduces information asymmetry, Lee noted that this costly policy (among others factors) has contributed to significantly higher average prices in the AUCNet marketplace compared to those in traditional automobile auctions. On the contrary, feedback mechanisms reduce uncertainty regarding seller quality without increasing the average prices of products, which are significantly lower compared to traditional markets (Kauffman and Wood 2000). Therefore, a significant advantage of employing feedback mechanisms lies in the low cost for its implementation. Furthermore, accreditation mechanisms similar to AUCNet's quality inspection prevent a market for "lemons" by providing a rating indicative of the car's quality. Similarly, feedback mechanisms also avoid a market with "lemon" sellers by providing a rating that is indicative of the seller's quality.

While this research only examined the effect of credibility trust in an electronic transaction, it is not the purpose of this paper to undermine the importance of the other dimension of trust - benevolence. Although other researchers have argued that benevolence is the only stable form of trust (Granovetter 1985), we argue that credibility is a more robust form that

can be built without familiarity and personal interactions. Since a growing number of electronic transactions will take place without personal interactions, the role of credibility trust will consequently become more important. Lewicki and Bunker (1995) suggest that among the different levels of trusting relationships, calculus-based trust in one's credibility is the most fragile. However, this paper provides theoretical evidence that credibility trust is not so fragile and can be a powerful form of trust to facilitate electronic transactions, given a robust feedback mechanism.

By including product type and product price as moderating variables in the research model, we extended the current literature that looks at trust in the online market – the extant research mainly focuses on the consequences of trust. We have demonstrated in this paper that transaction-specific risks are highly intertwined with trust. Building trust alone is a necessary, but not a sufficient, condition to generating a positive economic outcome. In addition to a good reputation, other factors will affect the relationship between trust and price premiums, therefore warranting future theoretical investigations.

Implications for Practice

One important insight that comes out of this research is that it is indeed possible to create credibility trust without prior interactions, encouraging firms to expand their business horizons and explore new opportunities. The recent stock market shake-up in the Internet sector and continuous reports on Internet frauds have raised questions about the viability of electronic commerce (Economist 2001). Many firms consequently have scaled back their online activities, resorting to old transaction models in which they deal with only a handful of business partners. This research indicates that proper mechanisms can be set up to induce trust, even between

business parties that have never transacted with each other before, and to produce a favorable economic outcome.

Another major contribution of the studies lies in the fact that it highlights the role of product characteristics in increasing transaction-specific risks. Perceived risk factors have been considered important in online transactions (Jarvenpaa and Tractinsky 1999, Jarvenpaa et al. 2000). This study provides empirical evidence that accumulating positive feedback ratings is only one part of the trust building process. Sellers – online companies in general, for that matter – need to be aware of how certain product characteristics such as product type and product price affect transaction-specific risks and buyer behavior, and structure their online product offering strategy accordingly to mitigate those risks. For example, they might offer a better warranty policy for expensive products. This result sheds light on why some dot.com companies were never able to attract enough transaction volume to stay in business: differences in transaction-specific risks between the online environment and the physical market demand different trust building effort. Firms venturing into the online market need to be aware of the sources of the risks and tailor their market strategy accordingly. For example, when a firm first starts online retailing, what products should they offer? All products are not equal. There are different degrees of information asymmetry associated with different products. Wrong initial product offerings could jeopardize the firm's chance to succeed in the online market. However, once the firm has established a solid reputation, information asymmetry may no longer impose as big a risk to a consumer. The consumer may be more willing to buy products that were considered "too risky" before. In short, companies planning to compete in the electronic market need to carefully devise their strategy based on their product offering and provide information that is designed to help consumers understand their products.

A good reputation, and the trust associated with it, works not only in the market where it is originally generated. Research has shown that trust is transferable (Lewicki and Bunker 1995). Sellers could use an accumulated positive reputation to receive economic advantages in different settings. The online market makes this transfer process extremely easy. For example, BestPriceAudioVideo.com advertises on its own website its feedback profile accrued in eBay's auctions and Bizrate.com. By having a link to the other websites where its reputation is shown, BestPriceAudioVideo.com transfers its reputation to its own storefront in hope of establishing trust and gaining price premiums. Therefore, online feedback profiles may be viewed as readily transferable sources of trust which could lead to economic and social advantages.

At the aggregate level, the Feedback Forum at eBay has become a competitive advantage for the company. For example, Amazon.com attempted to boost its own auction marketplace by allowing sellers to import their feedback profiles from eBay to Amazon. However, eBay strongly objected to such an attempt, arguing that the Feedback Forum is its own asset. Even though this dispute never reached legal jurisdiction that would provide evidence for the perceived value of eBay's feedback mechanism, it is evident that there is a practical economic value attached to the institution of trust-building technologies.

Our research also provides insights into ways of building a better feedback mechanism. Currently, eBay shows a member's feedback summary in the aggregate form: the number of positive ratings minus the number of negative ratings. Our experimental study indicates that negative ratings carry a much stronger effect than positive ones on a buyer's trust level and consequently the price premium he is willing to pay. Reporting the feedback in the aggregate form minimizes the impact of negative ratings, thus lowering the effectiveness of the mechanism.

An examination of the actual feedback profiles from eBay reveals that the overall number of negative ratings is extremely low, contradictory to reports that online auctions account for 87% of all Internet frauds (Internet Fraud Watch 2000). One explanation is that there is no anonymity when giving negative ratings at eBay – the user ID is always associated with each rating and comment. Since the negative ratings carry a heavy weight, leaving negative ratings may cause retaliation. Therefore, many members may be reluctant to leave negative ratings, fearing the action may endanger their own feedback profile. An alternative explanation for the low number of negative ratings is that when a member receives several bad ratings, he may abandon his online identity and re-enter the market under a new identity. Currently, auction sites do not have strong authentication methods to prevent such a behavior, and the cost of obtaining a new online identity is close to zero. Consequently, the auction market may appear to have fewer "lemons" than it actually does. Without appropriate corrective measures, the long term viability of the electronic market may be in question.

Suggestions for Future Research

There are several ways in which future research could strengthen the results of this study. First, the results and implications of this research may be constrained by the research context of the auction mechanism. Though our findings support the general theoretical framework, it is also possible that a different sequence of relationships is acting simultaneously. Similar to all cross-sectional studies, longitudinal research can further enhance or refute our empirical findings. In addition, the dynamic and constantly changing context of the online auction environment may affect the nature of electronic markets in the future. Therefore, longitudinal studies will probably

be the research method of choice for understanding the role and nature of trust in electronic markets.

It should be clear that this research examined only a subset of the many possible relationships between trust and its antecedents, consequences, and moderating variables. Future research should take a more extensive approach to cover all possible positive and negative antecedents of trust in electronic markets. In addition, many other constructs may act as moderators in the causal relationship proposed by our conceptual development. While there is some substantial support for our hypothesized model, direct effects between the antecedents and consequences of trust may exist that were not directly tested by the nature of our statistical analysis.

While our research model proposes that trust induces price premiums, we do recognize the possibility that price premiums may also be caused by other factors, such as buyers' personal preference, socio economic status, past experience with online auctions, private valuations, etc. There is much unexplained variance in both trust and price premiums. Future research should include more control variables to pinpoint the relationship between trust and price premiums.

Our argument suggests that trust reduces the effect of transaction-specific risks on price premiums, thus extracting some social welfare. Moreover, price premiums suggest that sellers absorb at least some of this welfare as rents. However, compared to traditional markets, credibility could be quickly generated on the Internet given appropriate feedback mechanisms, allowing room for more intense competition among sellers. According to economic theory, this competition would eventually give some of the price premiums back to the consumers, passing some of the benefits of trust back to them. It is beyond the scope of this research to give a definite answer on the nature of this social welfare and its allocation. Nevertheless, the fact that

trust creates some surplus for the sellers suggests that markets can gain (in aggregate) from the existence of trust in exchange relationships. Therefore, future research should attempt to provide more specific answers to the positive outcomes of trust.

While a perfectly guarded feedback mechanism could build trust and bring favorable economic and social benefits, fears of opportunism could erode the foundations of this trust-building technology. For example, the business press shows a plethora of cases where opportunistic individuals committed fraud by attempting to manipulate their feedback profile on eBay (Industry Standard, March 26, 2001), despite eBay's claim that there have only been very few fraudulent auctions. Kauffman and Wood (2000) argue that many instances of opportunism have been detected in auctions of collectible coins, and Resnick et al. (2000) describe several problems associated with eliciting a proper trust-building technology. Therefore, while this paper focuses on the issue of whether a buyer trusts a seller or not based on the seller's feedback profile, another important question is whether a buyer should trust the seller's feedback profile and the entire feedback mechanism. According to Shapiro (1987), the guardians of a feedback mechanism have to be trusted for the mechanism itself to be trusted. Therefore, the guardians of feedback mechanisms, similar to sellers, should also try to build buyer's trust. Consequently, an important question arising from this research is whether trust in the institution of a feedback mechanism could also result in positive economic and social outcomes, and how such trust could be created.

As the economy transforms into an electronic marketplace with the proliferation of electronic commerce and interorganizational trading exchanges, information asymmetry and opportunism could increase as more transactions take place among many anonymous agents across the Internet. Therefore, basic trust in a partner's credibility that is induced by appropriate

IT-driven feedback mechanisms will become an important component of electronic exchange relationships. Trust could generate positive outcomes by reducing transaction risks, augment the extent of electronic markets, and assist the proliferation of the electronic economy.

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Figure 1: Research model.

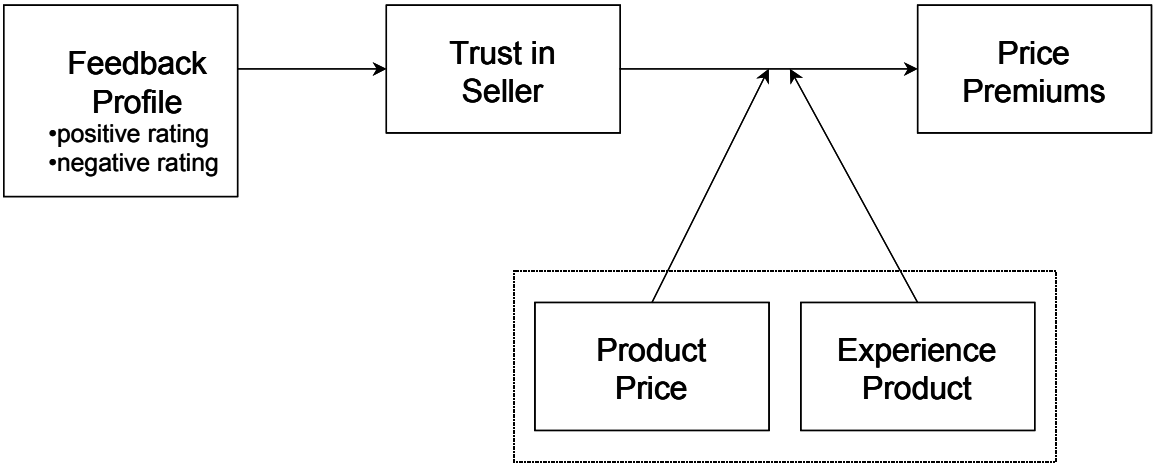
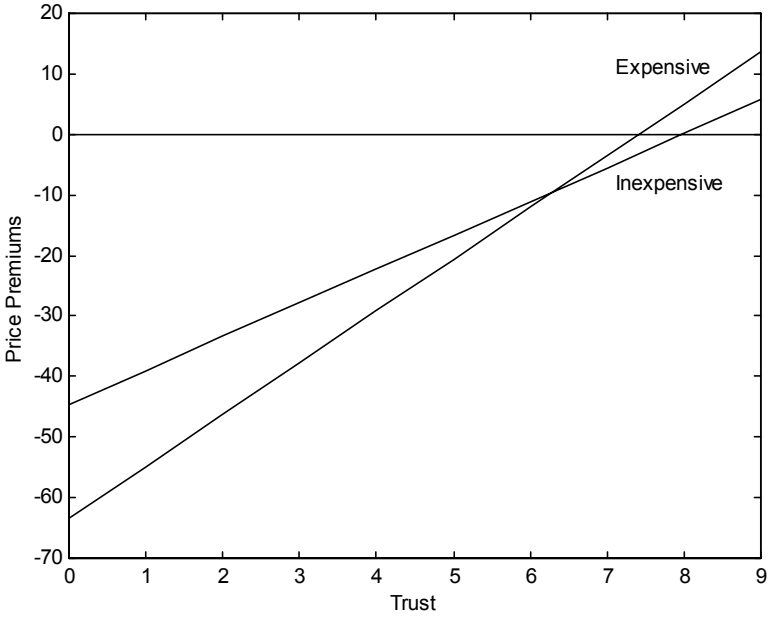


Figure 2: The moderating effect of product price and product type on the relationship between Trust and Price Premiums.

(a)



(b)

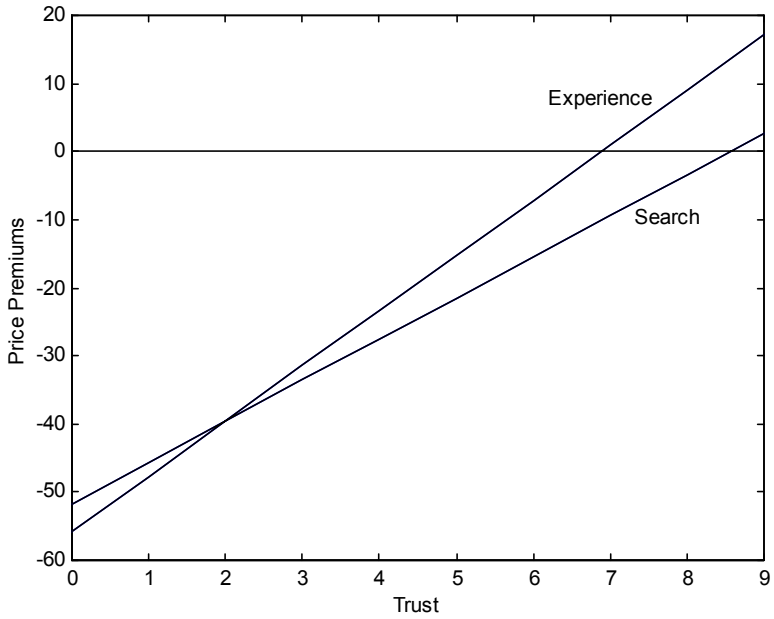


Table 1: Sources of Trust.

Source of Trust	Explanation
Familiarity	Repeated interaction that leads to trust or mistrust
Calculativeness	A subjective assessment (calculation) of the costs and benefits to the other party of cheating
Values	Norms that encourage confidence in trustworthy behavior and goodwill

Table 2: Dimensions of Trust.

Dimensions of Trust	Explanations of the Dimension
Benevolence	The belief that a partner is genuinely interested in the other partner's welfare and has intentions and motives beneficial to the other party even under adverse conditions for which a commitment was not made.
Credibility	The belief that the other party is honest, reliable, and competent.

Table 3: Measurement instrument and relevant statistics.

Measures and Items	Cronbach's Alpha & Item-to-total Correlations	Source
Trust in Seller's Credibility (Mean=6.1, STD=1.85)*	**.98**	
1. I think this seller is honest.	.91	Ganesan (1994)
2. I believe this seller will deliver to me the product I purchase according to the posted delivery terms and conditions.	.95	Sako (1992)
3. I believe this seller will deliver to me a product that matches the posted description	.96	Sako and Helper (1998)
Price Premium (Mean=-10.5%, STD=18.8%)** 1. If you want to bid on this product available from the above seller, what is the maximum bid you are willing to submit to win this auction?	.82	Standard Item

*: 1=strongly disagree, 5=neither agree nor disagree, 9=strongly agree
**: Percentage above or below average price

Table 4: Descriptive statistics of trust and price premiums.

	Trust	Price Premiums (%)				
		PP	PP_{IE}	PP_{IS}	PP_{XE}	PP_{XS}
$S_{445,0}$	8.4 (1.1)	11.9 (19.4)	12.6 (28.1)	-2.8 (29.0)	21.5 (26.5)	16.1 (36.2)
$S_{33,0}$	7.6 (1.2)	5.7 (18.7)	10.3 (26.7)	-8.3 (27.0)	16.4 (31.9)	4.4 (35.8)
$S_{0,0}$	5.3 (0.9)	-15.9 (26)	-7.4 (30.1)	-20.0 (26.0)	-17.0 (36.9)	-19.0 (37.8)
$S_{34,3}$	5.3 (1.7)	-21.3 (27.3)	-9.0 (30.4)	-21.0 (28.0)	-26.7 (35.1)	-28.7 (36.5)
$S_{447,39}$	3.9 (2.0)	-32.6 (30.7)	-22.0 (37.1)	-30.5 (33.0)	-40.0 (35.7)	-38.0 (40.4)
Overall Mean	6.1 (2.2)	-10.4 (29.9)	-3.1 (33.2)	-16.5 (30.0)	-9.1 (41.2)	-13.0 (42.3)

NOTE: Descriptive statistics for trust and price premiums (PP) for the five seller profiles and four product types. S refers to seller profile, where the first subscript refers to the number of positive ratings, and the second the number of negative ratings. The subscript for PP refers to product price and type, where subscript x refers to expensive, i to inexpensive, e to experience, and s to search products. PP without subscripts is the simple average of the PPs for all four products. N=95 for each group.

Table 5: Correlation matrix.

	Log(PR)	Log(NR)
Log(PR)	1.00	
Log(NR)	0.48	1.00
Trust	0.12	-0.59

Table 6: Multivariate regression analysis for trust in seller's credibility.

	R^2 (adjusted)	**F-value**	**b_i**	**t-value**	**Tolerance Value**
Regression	0.57	244.447***			
Log(PR)			0.541	13.787***	0.763
Log(NR)			-0.856	-21.812***	0.763
Constant				35.976***	

***: *p<.001*

Table 7: Regression results between trust and price premium by product.

	Independent Variable: Trust			
Dependent Variable	**R^2**	**F-value**	**b**	**t-value**
PP_{IE}	0.196	88.3***	0.442	9.40***
PP_{IS}	0.107	43.49***	0.327	8.16***
PP_{XE}	0.259	127.2***	0.509	11.28***
PP_{XS}	0.155	66.6***	0.394	8.16***

NOTE: PP refers to price premium, the subscripts indicate the product price and product type: x refers to expensive, i to inexpensive, e to experience, and s to search. All coefficients are significant (***: $p<0.001$).

Table 8. Testing the mediating effect of trust.

Regression Equation	**R^2 (adjusted)**	**F-value**	**b_i**	**t-value**
Equation (1)	0.572	244.447***		
Log(PR)			0.541	13.787***
Log(NR)			-0.856	-21.812***
Equation (2)	0.302	79.763***		
Log(PR)			0.361	7.207***
Log(NR)			-0.630	-12.569***
Equation (3)	0.326	59.569***		
Log(PR)			0.230	3.771***
Log(NR)			-0.422	-5.624***
Trust			0.244	3.690***

***: $p<.001$

Table 9: Regression results with the moderating variables for study 1.

Regression Equation	**R^2 (adjusted)**	**F-value**	**b_i**	**t-value**
Equation (4)	.172	304.34***		
Trust			0.416	17.445***
Equation (5)	.185	111.192***		
Trust			0.414	17.349***
Type			-0.028	-1.117
Price			-0.004	-.186
Equation (6)	.195	71.655***		
Trust			0.247	5.824***
Type			-0.027	-.113
Price			-0.004	-0.168
Trust*Type			0.235	4.703***
Trust*Price			0.07	2.269**

****: p<.01, **: p<.05, *: p<.1*

Table 10: Descriptive statistics of the mean and standard deviation of each product's auction winning price and product type.

Product Description	Product Price	Product Type	N
3Com Web Camera	100.5 (9.2)	5.26 (1.75)	18
Adobe Photoshop	353.6 (68.7)	5.71 (2.04)	54
Canon Camcorder	1140.2 (82.5)	4.57 (2.20)	20
Canon Scanner	235.6 (24.0)	5.11 (1.80)	25
Celine Dion CD	9.6 (1.8)	6.24 (2.03)	58
Compaq Memory	422.6 (55.6)	4.80 (2.22)	31
Gran Turismo 2	28.8 (3.1)	5.60 (1.71)	67
HP Laser Printer	285.4 (33.2)	5.23 (1.83)	25
Motorola Modem	16.8 (5.3)	5.27 (2.05)	53
Palm V Organizer	262.9 (28.4)	5.52 (1.98)	35
Pokemon Gold	39.8 (7.2)	5.53 (1.97)	47
QuickenPro 2000	41.7 (5.3)	5.79 (1.89)	31
Santana CD	8.5 (1.2)	5.9 (2.0)	54
Sony Camera	808.3 (47.9)	4.90 (1.92)	30
Sony DVD S330	251.0 (18.4)	5.08 (1.88)	32
Sony DVD S530D	321.2 (23.2)	5.10 (2.22)	31
Windows 2000	181.3 (27.5)	5.75 (2.10)	57
Windows Server	1413.9 (199.6)	5.47 (2.35)	14
All Products	232.3 (305.6)	5.48 (0.40)	682

Table 11: Multivariate regression analysis by product.
Independent Variables: Log(PR), Log(NR)
Dependent Variable: PP

Product Description	R^2	F-value	b_{PR}	t_{PR}	b_{NR}	t_{NR}
All Products	.14	54.069***	.343	8.379***	.051	1.236
3Com Web Camera	.40	6.576***	.363	1.326	.373	1.365
Adobe Photoshop	.36	15.919***	.624	5.522***	-.273	-2.416**
Canon Camcorder	.85	55.234***	.974	9.836***	-.107	-1.083
Canon Scanner	.20	3.999**	.095	.357	.444	1.672
Celine Dion CD	.06	2.895*	.302	2.271**	.023	.172
Compaq Memory	.37	9.749***	.549	2.184**	.109	.435
Gran Turismo 2	.22	10.306***	.530	4.199***	-.082	-.649
HP Laser Printer	.18	3.676**	.310	1.205	.233	.907
Motorola Modem	.19	6.964**	.445	2.473**	.030	.164
PalmV Organizer	.14	3.700**	.476	2.702**	-.152	-.865
Pokemon Gold	.11	3.857**	.373	2.360**	.026	.166
QuickenPro 2000	.17	4.044**	.392	1.571	.102	.410
Santana CD	.05	2.407*	.196	1.270	.141	.912
Sony Camera	.67	30.46***	.895	7.503***	-.172	-1.444
Sony DVD S330	.33	8.770***	.703	2.890***	-.116	-.478
Sony DVD S530D	.44	12.898***	.895	4.935***	-.427	-2.352**
Windows 2000	.14	5.542***	.416	2.827***	-.005	-.037
Windows Server	.55	8.881***	.556	2.121**	.288	1.099

NOTE: Multicollinearity checks for the eighteen regressions all returned a tolerance value above .70.
****: p<.01, **: p<.05, *: p<.1*

Table 12: Moderated regression analysis results for study 2.
Dependent Variable: Price Premiums.

Independent Variables	**R^2 (adjusted)**	**F-value**	**b_i**	**t**
Regression 1	.13	54.069***		
Log(PR)			.343	8.379***
Log(NR)			.051	1.236
Regression 2	.13	27.070***		
Log(PR)			.342	8.185***
Log(NR)			.055	1.279
Type			.025	.577
Price			.021	.510
Regression 3	.14	14.267***		
Log(PR)			.797	1.202
Log(NR)			.195	.289
Type			.117	1.211
Price			.004	.043
Log(PR)*Type			-.489	-.756
Log(PR)*Price			.108	.886
Log(NR)*Type			-.072	-.115
Log(NR)*Price			-.146	-1.657**

****: p<.01, **: p<.05, *: p<.1*

Table 13: The key findings of the studies.

Research Questions	Experimental Study	Field Setting
Do feedback mechanisms induce trust?	• Better feedback profiles induce higher level of trust	• Trust not explicitly measured
How do positive and negative feedback ratings affect trust formation?	• More positive ratings lead to higher level of trust • Negative ratings have a stronger negative impact on trust than positive ones	• Trust not explicitly measured • Positive ratings show a strong impact • Negative ratings fail to show significant impact
Does trust promote price premiums?	• Higher level of trust leads to higher price premiums	• Positive ratings lead to higher price premiums • Negative ratings fail to show significant impact
What is the moderating effect of transaction risks (product type and expensiveness)?	• For expensive products or products with more experience attributes, relationship between trust and price premium is stronger	• For expensive products, negative ratings suppress price premiums