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Break the Trust Threshold: Customer Ratings and Trust Building on eBay Auctions

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ABSTRACT

Trust in the context of online auctions is an understudied research area with significant implications. In this paper, using longitudinal process view of trust and trustworthiness development, we empirically demonstrate that trustworthiness thresholds do exist in the context of online auctions. Further, our findings suggest that considering the context in which trustworthiness is assessed is important; different thresholds exist for high- and low-risk contexts. It takes longer for vendors of high-risk products to reach the trustworthiness threshold than it does for vendors of low-risk products. Our research confirms that trust and trustworthiness are not static phenomena, but rather are complex phenomena that emerge over time.

Keywords

Trust, Trustworthiness, Reputation, Threshold, Time Series, Feedback Mechanism, Online Risks

INTRODUCTION

Online auctions have emerged as an important component of the economy in the United States. eBay, Inc., perhaps the dominant player in the online auction industry, handled \$18.9 billion worth of merchandise auctions in 2003, with a 48% increase in 2004, and a 36% increase in 2005. In 2002, 21% of American households made at least one purchase through an online auction (Chong, 2004). The remarkable growth of eBay has been fueled by the significant growth in the number of small vendors (Wingfield, 2002), among other factors.

In online auctions, many vendors are effectively anonymous to buyers as buyers often have little or no prior knowledge of the vendors. In addition, buyers suffer from information asymmetries in terms of the product (Reichheld and Scheffer, 2000). Further, buyers in the online environment are subject to a variety of threats, including inappropriate opportunistic behavior, misuse of personal information and credit card fraud (Gefen, 2002).

These threats lead trust to be an important consideration in online commerce. The importance of trust in consumer electronic commerce has been demonstrated across a range of empirical studies (Dellarocas, 2003; McKnight, et al, 2002; Pavlou and Gefen, 2004; Van Slyke, et al 2004).

Trust in the context of online auctions may be different from trust in other e-commerce environments (Komiak and Benbasat, 2004). One critical difference is that in the online auction environment, buyer-vendor relationships tend to be short term. Therefore, it is difficult for vendors to build trust through repeated successful interactions with a particular customer. Because of this, buyers must assess a vendor's trustworthiness through indirect means. Auction providers (such as eBay) have developed customer feedback systems to provide a way for consumers to assess an unfamiliar vendor. Using cross-sectional data, information systems researchers have explored the impact of customer feedback on trust (Ba and Pavlou, 2000; Gefen and Straub, 2004). While certainly worthwhile, these snapshot views do not explore how trust emerges over time. The trust building process has multiple stages, including development, building, stability and possibly dissolution (Rousseau, Sitikin, et al. 1998). In this paper, we explore how customer feedback impacts trust over time. Specifically, we examine whether a threshold exists with respect to impact of customer feedback on trust. We propose that trust will build very gradually until this threshold is reached. Once the threshold is passed, sufficient trust exists to enable the vendor's sales volume to increase at a more rapid pace.

Because trust is context-dependent, we also examine whether different threshold exists for low-risk and high-risk purchases. Mayer et al (1995) suggest that the level of trust is compared to the level of perceived risk in a situation before a decision is

made on the course of behavior. If a transaction or other behavior involves no risk, trust is not likely to impact the behavior (Ratnasingham, 1998). The transaction environment is one element that determines the level of risk present in a context (Mayer, Davis, and Schoorman, 1995). Product cost is one important element of transaction environment that impact risk. All other things being equal, the higher the cost of a product, the higher the level of risk for potential buyers.

In this paper, we use longitudinal customer feedback data from an online auction to examine whether a trust threshold exists, and if so, at what level. Further, we investigate this in both low- and high-risk contexts to determine whether the threshold point differs according to the trust context. Data analysis indicates that not only does the threshold exist, but it does indeed differ according to context.

LITERATURE REVIEW

Trust

Trust is studied across a wide range of disciplines using different theoretical lenses. These studies lead to multiple widely-accepted trust definitions (McKnight et al, 2002; Gefen, et al, 2003; Gefen, 2002; Doney and Canon, 1997).

In psychology, Rotter (1967) defined interpersonal trust as the expectation held by an individual or a group that the word, promise, and statement of another can be relied on. In management theory, Rousseau (1998) synthesizes various popular definitions to conclude that trust should be defined as “a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another”. According to Rousseau’s analysis, trust includes an interactive relationship between trustor and trustee. Further, the concepts of risk and interdependence are evident in this definition. Rousseau (1998) emphasizes that trust is an underlying psychological condition and it is distinct with respect to a behavior or a choice such as risk taking. Its logic presentation is “A trusts B in something C”.

“Trustor A”, “trustee B”, and “something C” compose the main framework of trust. For instance: in deciding whether to lend money to a friend, it is the question whether we trust that this friend will timely reimburse this money, as well as how much the sum is. Within this framework, trust’s static/dynamic meaning and trustworthiness play important roles. When trust is treated as static and stable phenomena, it is under the assumption that all external factors, which include the trustee and the transaction context, are consistent and given. The measure of such trust is focused on one time point with a given set of conditions (Rousseau et al., 1998). However, this understanding may not reflect the reality of the trust building process. Trust changes over time and it may either develop or decline according to the of the external environment (Fukuyama, 1995; Miles and Creed, 1995). If we use a static trust meaning to replace a dynamic trust meaning without considering the underlying condition, static trust actually combines trust building, stability trust, and trust dissolution effects as one phenomenon. However, in each of these three stages, trust has its specific characteristics. The dynamic view of trust building matches the process view of trust, although it causes difficulties with respect to measurement and control. In online auction situation, the before-interaction and initial interaction trust are more important because the customers could seldom meet the same vendor (Komiak and Benbasat, 2004). Therefore, the repeated interaction trust, or the long term and stable static trust may not be fully applicable to online auctions.

Trustworthiness

Trustworthiness refers to a set of specific beliefs about a specific other party. In the e-commerce literature, trustworthiness is often considered to be the result of a combination of beliefs concerning the integrity, benevolence, and ability of the trusted party (Gefen, Karahanna, and Straub, 2003). Trustworthiness is treated as the antecedent of trust (Mayer, 1999; Mayer et al., 1995). In addition, assessments of trustworthiness, and subsequent trust are context-specific (Gefen and Straub, 2004).

Although there is some agreement (although not universal) in the e-commerce literature regarding the dimensionality of trustworthiness, such as competence (Menon, et al 1999; Stewart, D.E. 1999), benevolence (Ba, and Pavlou, 2002), and goodwill (Fung and Lee, 1999), in the broader literature there is tremendous variation in the dimensionality of trustworthiness (Butler, 1991; Strickland, 1958). The diversity of antecedents is caused by different theoretical foundations for trust and different research interests across multiple disciplines (Mayer et al., 1995).

This diversity of theoretical perspectives on trust and trustworthiness allows researchers to examine these constructs using the perspective that is deemed most appropriate for the research context of interest. For example, in the e-commerce literature, Palvou and Gefen (2004) use institution-based trust to suggest that third party’s recommendation such as customer feedback is an important element of trustworthiness building in the context of e-commerce. Positive customer ratings are rewarded in future sales. Others have used different theoretical perspectives to arrive at similar conclusions. Using a calculative-based view of trust, Ba and Pavlou (2000) posit that in an auction environment, long-term, accumulated positive feedback helps vendors build their reputation, which leads to higher levels of trustworthiness. Buyers use the sum of positive feedback in a given time period to calculate their cognitive trust on vendors. The desirability of positive feedback serves as a deterrent to sellers engaging in opportunistic behavior (Ba, Whinston, and Zhang, 2000; Ba and Pavlou, 2002).

In this study, we build on earlier research into the effect of positive feedback to examine whether there are thresholds, or inflection points in the effect of such feedback on sales. Further, we investigate whether context has an impact on this threshold and its subsequent impacts.

RESEARCH HYPOTHESES

Customer Ratings and Trust Threshold

Customer ratings facilitate transactions by providing a rational basis for assessment (Zucker, 1986). In an online auction environment, customers are not able to directly access information about a vendor's reputation as easily as they might in a traditional brick-and-mortar environment. This is especially true when a vendor is new to a customer, as is often the case in an online auction context. In essence, customer feedback is a market signaling device, which is particularly important given the uncertainty present in online auctions. Specifically, positive feedback provides evidence of vendor trustworthiness. In addition, the desire for positive feedback provides an incentive for fair dealing on the part of vendors (Ba et al., 2000).

eBay uses English auction as method for commodity auctions. After the bid time is closed, the highest bidder wins the auction item. The winner then must pay for the item before it is actually delivered. This arrangement requires the buyer to trust that the seller will actually deliver the product as promised. Therefore, the assessment of the trustworthiness of a vendor is a critical element in an online auction environment.

The potential customer may use feedback from the vendor's previous customers to form a belief about the vendor's trustworthiness. If this assessment of trustworthiness exceeds the customer's requirements for a particular transaction, that transaction may occur. If trustworthiness is not sufficient to meet or exceed the customer's requirements, the transaction is unlikely to take place. In such situations, buyers may move to alternate vendors, when other options are available.

Essentially, buyers seek to reduce the uncertainty inherent in dealing with a new vendor. When individuals are faced with decisions as to whether to engage in a behavior with uncertain outcomes, they seek out others who have experience with the similar behavior (Valente, 1996). Potential buyers must make a static assessment of the vendor's trustworthiness. Static trustworthiness assessments are "all-or-nothing" views (Axelrod, 1984; McKnight, et al, 1998). Either the vendor is sufficiently trustworthy to warrant engaging in the particular transaction, or it is not.

For a given context, there exists a point at which sufficient positive feedback exists to provide evidence to overcome the trustworthiness thresholds of a large number of potential buyers. At this point, sales for that vendor will increase at a more rapid pace. We call this point of inflection the trustworthiness threshold, as reflected in Hypothesis 1 below.

H1: In the context of an online auction vendor, a "trustworthiness threshold" of customer feedback exists, after which the vendor's sales will increase at an increasing rate.

Transaction Context and Trust Thresholds

As stated earlier, trust and assessments of trustworthiness are context-dependent. The level of trustworthiness required in one situation may vary from that required in another situation. One important aspect of context, such as price and product characteristics, is risk.

Risk and trust have been closely linked in the literature. To some, risk is a necessary condition for trust to exist (Stikin and Pablo, 1992). If no risk is present, there is no sense of being vulnerable, and therefore trust need not exist. While there is some disagreement on this point, it is clear that trust influences the level of risk that one will tolerate. The higher the level of trust, the more vulnerable the trustor is willing to be. This can also be put in the context of trustworthiness. All other things being equal, the higher level of risk that is present in a situation, the higher the trustworthiness assessment must be in order for the trustor to engage in the target behavior.

In an online auction environment, the nature of the focal product is an important element of risk. The characteristics of the product and the price both impact risk levels. Some products are relatively uniform and are relatively easy to describe. For example, it is relatively easy to determine communicate information about a book. If the buyer knows the title, author, publisher and language of a book, it is relatively easy to determine whether a book listed by an auction vendor is the book being sought by the buyer. (Of course, the condition of the book may be more difficult to communicate.) Typically, books are also inexpensive relative to many other products commonly offered for auction. From an economic perspective, there is little incentive for opportunistic behavior on the part of the vendor; the benefit from dishonest behavior is not likely to bring sufficient gain, in cost of ruin long term reputation. Even when opportunistic behavior does occur, it is unlikely to bring about large losses to the buyer. Therefore, the risk involved in most book auctions is relatively low.

Contrast this with other products, such as expensive jewelry. These products are not only relatively much more costly than books (typically), it is also more difficult to communicate sufficient information about the product to enable the buyer to

assess the product. Even with high-quality pictures of the item, it is difficult to determine the quality of the product. Web-based images of real and costume jewelry may look very much alike. The relative difficulty in assessing the suitability of the product, coupled with the higher price, translates into higher risk for the buyer. It is expected that this higher risk brings with it a higher trustworthiness threshold. For any given individual, a higher trustworthiness assessment must be present in order for the individual to bid on a higher risk product, such as jewelry, when compared with a lower risk product such as a book. Thus, we posit the following hypothesis:

H2: In an online auction, the context of the transaction, as indicated by the risk level associated with the transaction, will influence the point at which the trustworthiness threshold occurs.

RESEARCH METHOD

Data Collection

In order to investigate the validity of our hypotheses we conducted an empirical study using eBay vendor feedback data. As the world's largest online auction site, eBay has millions of items available for bid. After each successful bid, the winning bidder is requested to provide feedback regarding the transaction. As part of this feedback process, the buyer is asked to rate the transaction as positive, negative or neutral. Once placed, the rating becomes a permanent part of the vendor's eBay record, and cannot be removed under normal circumstances (Stadifird, 2001).

Beside the individual sellers, who sell one-of-a-kind secondhand goods or collectibles, there are eBay store vendors, who build their online store on eBay. These merchants have frequent transactions and their products often focus on specific classifications of goods. Tracing customer feedbacks from these eBay store merchants provides an ideal context for investigating the importance of trust building on online auction environment.

Data for this study come from the vendors' customer feedback of two sets of particular products: textbooks and diamond solitaire rings. We chose the textbook category as an exemplar of a low-risk context, while the diamond ring was chosen to represent a high-risk context. To be included in the data set, the vendor must have: 1) at least one year's worth of feedback records, and 2) two hundred or more transactions. In addition, we chose vendors who focus on these product categories. To make the data set manageable, we limited our list of vendors to those who met the above requirements and were listed among the first three hundred items of the relevant product categories. Finally, to reduce the potential carryover effects from well-known brick-and-mortar vendors, we excluded those with well established reputations, such as Tiffany.

Applying the above criteria yielded 25 textbook vendors and 28 vendors for diamond rings. We collected the number of feedback listings for each day within the study period.

Dependent Variable and Independent variable

To mitigate differences due to the day of the week, we aggregated the frequency of feedback for all days within a week into a single number. Such aggregation has the additional benefit of smoothing the data. We also used weeks to code time, with the first week of the vendor's existence coded as one, the second week as two, and so on. Because eBay strongly encourages all buyers to leave feedback, we use the number of feedback listings as an approximate count of the number of sales a vendor has. In addition, since the overwhelming proportion of feedback ratings are positive, we used the total number of ratings as a surrogate for trustworthiness. We believe this is valid given that feedback from previous customers is a major source of trustworthiness information for prospective buyers.

Data were treated as a time series, with a one week lag because the average delivery time for eBay purchases is one week. This results in the following time series regression model:

$$Y_t = \alpha + \beta X_t + u_t, \text{ at } t = 1, 2, \dots, m, \dots, n \quad (1)$$

where Y_t is Sales at time t , X_t is time trend (Y_{t-1}), and u_t is disturbance term.

To investigate the presence of a trustworthiness threshold (as stated in H1), we used the Chow test to look for changes in the structure of the regression equation (Chow, 1960). We systematically checked for structural changes by comparing the following equations:

Pre-structural change period (low-trust):

$$Y_{1t} = \alpha_1 + \beta_1 X_{1t} + u_{1t} \quad (2)$$

Where, $t = 1, 2, \dots, m$

Post-structural change period (high-trust):

$$Y_{2t} = \alpha_2 + \beta_2 X_{2t} + u_{2t} \quad (3)$$

Where, $t = m+1, m+2, \dots, n$

Basically, the Chow test is an application of F-test to test the null hypothesis $H_0: \beta_1 = \beta_2$. The Chow test statistic is computed using the sum of squared errors from the regression (1), (2), and (3) as following (Chow, 1960; Fisher, 1970).

$$F_{\text{Chow}} = \frac{(RSS - RSS_1 - RSS_2) / k}{(RSS_1 + RSS_2) / (n - 2k)} \sim F_{k, n-2k}, \quad (4)$$

where k is the number of parameter estimated.

We conduct n number of Chow tests for n time point to get the most significant structural break point, m . In other words, we look for the largest change in slope from one time period to the next. We perform these tests for each vendor in our study. Once we have identified the most significant structural break point, we use this point to investigate our hypotheses.

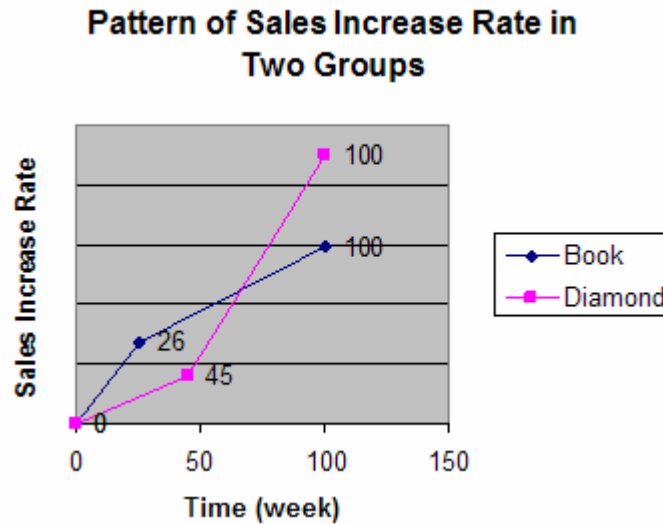


Figure 1: Pattern of Sales Increase Rate in Two Groups

The Chow tests indicate that the mean break point, or trustworthiness threshold, for each textbook vendor was 26 weeks, while the threshold for diamond ring vendors was 45 weeks (See Figure 1). One drawback of the Chow test is that it can detect random changes in slope. To investigate whether the break point was meaningful, we ran additional tests to determine whether these differences were meaningful, or were simply random. This is done to ensure that the direction of slope change before and after the break point is consistent across vendors within each context. These tests confirm that the direction of slope change is indeed consistent ($p < 0.05$ for both high and low-risk contexts).

Having established that the trustworthiness thresholds do indeed exist and are meaningful (rather than random), we turn our attention to investigation of H_2 , which posits that context impacts the threshold point. To examine the validity of H_2 , we performed a t-test to test the significance of differences in the thresholds for the low-risk and high-risk contexts. This test indicates that the difference is significant ($t = 4.616$, $p < 0.001$). Thus, H_2 is supported.

We also performed a post-hoc analysis to further examine the impact of context. To do this, we identified a second break point. After a period of time following the achievement of the trustworthiness threshold, growth in sales begins to slow, as indicated by a smaller regression equation slope (beta coefficient).

We examined two pair of beta coefficients. Each pair consists of a beta coefficient from each context. The first pair comes from time periods prior to the trustworthiness threshold. The second comes from the time period after the second break point. We call the former the low-trustworthiness level, and the latter the high-trustworthiness level. Interestingly, the difference between the high and low-risk contexts for the low trustworthiness level is more significant ($p = 0.046$) than for the high trustworthiness level ($p = 0.088$). The direction of the difference in the slopes (beta coefficients) is also interesting. For the low-trustworthiness level, the high-risk context has a shallower slope than the low-risk context. The opposite is the case for the high-trustworthiness level. (Recall that this difference is only borderline significant.) Table 1 shows the mean beta coefficients for each context and each trustworthiness level. Standard deviations are also provided.

	Mean beta	Std. Deviation
High-risk, low trustworthiness	0.1782	0.2489
Low risk, low trustworthiness	0.5231	0.7916
High risk, high trustworthiness	0.6708	1.3180
Low risk, high trustworthiness	0.2198	0.2954

Table 1 –Beta Coefficient Means

As can be seen from Table 1, when low levels of trustworthiness exist, sales increase more rapidly for the low-risk context than for the high-risk context (as evidenced by the beta coefficients). However, once the trustworthiness threshold has been breached, sales increase more rapidly in the high-risk context than in the low-risk context.

DISCUSSION

This research has investigated two issues. First, do trustworthiness thresholds exist in the context of online auctions? In other words, is there a point at which an online auction vendor becomes sufficiently trustworthy to bring about a rapid increase in sales? Second, we examined whether context has an impact on the point at which this trustworthiness threshold occurs. Our research indicates that trustworthiness thresholds do exist, and that context impacts the point at which this threshold occurs.

Trust is essential to online auction vendors. Snapshot views of trust in e-commerce indicate that trust levels are positively correlated with risk-taking behaviors and thus increase purchase activities (Ba and Pavlou, 2002; Gefen, 2002; Pavlou and Gefen, 2004). Our study has taken a more longitudinal view of the trust building process. Results indicate that trustworthiness levels go through stages. Initially, relatively few buyers view the vendor's trustworthiness as sufficient to warrant making purchases. However, as trustworthiness increases through positive feedback from earlier buyers, more buyers find the vendor to be sufficiently trustworthy, and the number of sales volumes grows at an increasing rate. If this continues, a trustworthiness threshold is reached, and a large number of buyers now find the vendor to be trustworthy, and sales explode.

Interestingly, this trustworthiness threshold exists at different points according to context (specifically, the level of risk involved). For vendors in our low-risk context, the mean trustworthiness threshold is 26 weeks. For vendors in the high-risk context, the mean threshold is 45 weeks. From this we can conclude that it takes much longer to build a sufficiently trustworthy reputation for high-risk products.

Our longitudinal view of trustworthiness development allows us to split the process into three stages. In the initial stage, when vendor's trust is below customer's requirement, the influence of trust on sale is restricted. During the accumulation of positive feedback, the vendor develops its reputation for trustworthiness. When trustworthiness reaches a threshold in this stage, the sales have a significant jump. This jump represents that the vendor's trustworthiness now exceeds the requirements of many potential buyers, and these buyers are now willing to expose themselves to the risks associated with making the auction purchase. After the trustworthiness goes through the threshold, even if trustworthiness still has a positive influence on sales, a more stable stage is entered. The increase rate is not as large as that in the second stage.

Another interesting finding of this research concerns the relative slopes shown in Table 1. For high risk products, such as diamond rings, sales increase relatively slowly prior to reaching the "tipping point" of the trustworthiness threshold. Once this threshold is reached, however, sales increase rapidly, even after the initial post-threshold burst (See Figure 1). This indicates that for high-risk products, reaching the trustworthiness threshold is a relatively long process, with a reputation for trustworthiness growing slowly with positive transaction feedback. In contrast, for low-risk products, such as textbooks, sales increase with time relatively rapidly, allowing vendors of these products to more quickly build a reputation for being trustworthy. However, after an initial jump in sales following the achievement of the trustworthiness threshold, sales growth slows, as indicated by the smaller slope.

As our results indicate, it is particularly difficult for online vendors of high-risk products to reach the trustworthiness threshold. Fortunately, our results may offer some insights for such vendors. In the context of low-risk products, trustworthiness and sales build more rapidly. Perhaps vendors of high-risk products should initially add lower-risk products to their offerings. Buyers demand relatively lower levels of trustworthiness in order to purchase low-risk products. By offering lower-risk products, vendors may be able to build a volume of successful transactions (and positive feedback ratings) more rapidly. This higher volume of positive feedback ratings may allow the vendor to exceed the trustworthiness threshold in a shorter time period.

LIMITATIONS

As is the case with any research project, ours suffers from a number of limitations. First, the study's context necessitates using surrogate measures for trustworthiness beliefs and sales transaction volume. Our findings should be confirmed in contexts where more robust measures are available. Second, as the negative feedback ratio is very small (less than 0.1%) among total transaction, we use the total transaction number as positive feedback number in the data collection process, even we have tested the negative feedbacks have not showed the significant impacts on future purchase, further control of negative feedback should be extended in future. In addition, we limited our investigation to a single online auction environment, eBay, and two product categories. The findings of this research could be strengthened by expanding the investigation to additional online auction environments and product categories.

CONCLUSION

The research presented in this paper answers Gefen, Karahanna, and Straub's (2003) call for more longitudinal examinations of trust. We have empirically demonstrated that trustworthiness thresholds do exist in the context of online auctions. Further, our findings point out that considering the context in which trustworthiness is assessed is important; different thresholds exist for high- and low-risk contexts. It takes longer for vendors of high-risk products to reach the trustworthiness threshold than it does for vendors of low-risk products. Our research confirms that trust and trustworthiness are not static phenomena, but rather are complex phenomena that emerge over time.

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