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What is the cost of venting? Evidence from eBay☆

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ABSTRACT

This paper uses data collected from eBay's website to identify why buyers fail to leave (negative) feedback in online markets. Empirical results confirm that the fear of retaliation may be an important motivation for buyers not to leave (negative) feedback, while the time and effort costs of reporting may not be as important.

1. Introduction

Reputation systems rely on voluntary feedback from traders to reduce information asymmetry and sustain trust, especially in online markets. Understanding participants' feedback behavior helps improve reputation systems and sheds light on a broad range of observed behaviors (e.g., teaching evaluations, recommendation letters, and referee reports).

Several authors find that buyers on eBay leave feedback about half the time. Moreover, in eBay's bilateral feedback system where both buyers and sellers can leave feedback after transactions, negative feedback is less frequent than positive feedback. Dellarocas and Wood (2008) and Klein et al. (2005) suggest that the fear of retaliation against the buyer who leaves negative feedback may be a reason for missing negative feedback. Thus, buyers' concern about their own reputations keep them silent, even if they are willing to spend time and effort on reporting their poorly performing counterparties. Another explanation of the lack of feedback may be the nuisance cost of the time and effort involved: feedback is a public good with no direct rewards. For example, the participation rate in teaching evaluations drops after changing from in-class paper evaluations to online.

In experimental economics, Fehr and Gächter (2000) and Nikiforakisy (2008) find that people are willing to bear costs to punish deviators but are less likely to punish when counterpunishment is possible. If buyers' feedback behaviors were consistent with the lab findings, buyers would be willing to bear the nuisance cost of leaving negative feedback (i.e., the cost to punish deviators),[1] but would be less likely to leave negative feedback when facing retaliation from strategic sellers (i.e., counterpunishment).

This paper adds to previous research by directly addressing the question of why people do not leave feedback. I examine *both* nuisance cost *and* fear of retaliation concerns in bilateral feedback systems. Instead of using a lab experiment, I compile a unique data set using eBay's 2003 policy change to identify whether nuisance cost is a consideration for a buyer's decision to leave feedback. I also develop a novel model that can analyze traders' decision-making process, particularly when the actual quality of products/services is not observable.

The empirical results suggest that, although fear of retaliation may be an important motivation for buyers' reluctance to leave feedback, time and effort costs of reporting may *not* be as important. Thus, further research on reducing nuisance costs may be a less fruitful approach to improving feedback mechanism design. These findings are relatively consistent with punishment and counterpunishment behavior in lab experiments.

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[1] This is supported by experiment results in Li and Xiao (2010).

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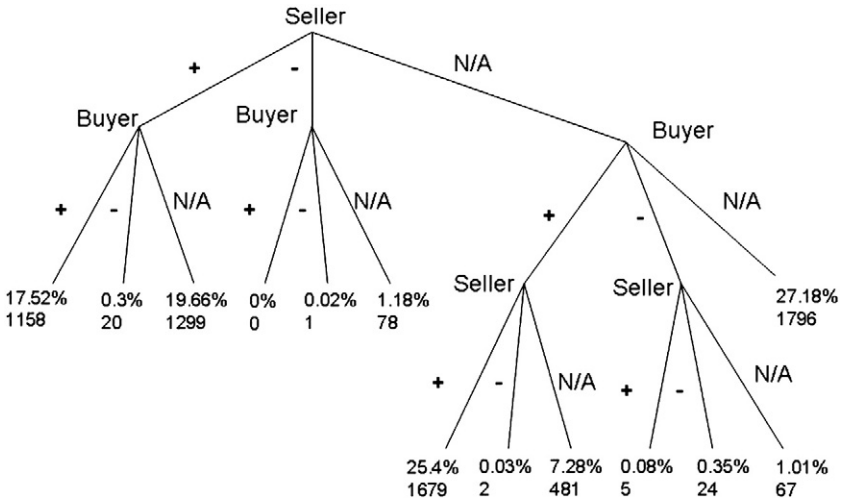

Fig. 1. Feedback decision tree with data.

2. Data

The data set contains information on 6610 successful eBay transactions for the iPod Nano MP3 player during the period September 1–30, 2006.[2] The data contain auction information, general information about sellers and buyers, and feedback information from each transaction. Fig. 1 shows the summary of all feedback behavior and timing. Each connector shows the type of feedback the person left regarding the other person in the transaction. Neutral feedback is counted as negative feedback, and N/A indicates no feedback was entered.[3] The percentage represents the proportion of transactions for each feedback timing pattern. The number below the percentage represents the number of transactions in each pattern.

The figure shows that buyers are more likely to leave positive comments or no comments than to leave negative feedback. These data appear to support the theory. Fig. 1 appears to suggest that buyers are concerned about retaliation and the extra time cost, which may deter buyers from leaving negative feedback.

In 2003, eBay introduced an additional tutorial site that *inexperienced* users whose feedback scores were less than or equal to ten must complete prior to leaving *neutral or negative* feedback. This policy did not apply to *experienced* users whose feedback scores were greater than ten or *any* users who leave *positive* feedback. On average, it takes about 5 min to complete the tutorial.[4] Therefore, this policy imposes additional nuisance costs only on inexperienced users who leave neutral or negative feedback.

Table 1 shows that the reported negative to positive feedback ratio is higher for inexperienced buyers than for experienced buyers. However, data are not available to show the actual number of good or bad transactions for inexperienced and experienced buyers. Therefore, based on the data, there is no way to tell whether the additional nuisance costs deter inexperienced buyers from leaving negative feedback. Further detailed data analysis is provided in the next section.

3. Analytical framework

To identify whether nuisance costs and fear of retaliation are reasons for buyers not to report, I test the following:

(1) Are buyers more likely to remain silent if sellers do not report first?
(2) Are inexperienced buyers more likely to remain silent than experienced buyers?
(3) If sellers do not report first, are buyers more likely to be silent when receiving low quality products/services versus high quality ones?
(4) Are inexperienced buyers more likely to remain silent than experienced buyers when receiving low quality products/services versus high quality ones?

To capture unobserved binary transaction outcomes, I build an empirical model that captures the sequence of events: transaction outcomes are selected by sellers first, then buyers choose whether to leave feedback. I use the maximum likelihood method to estimate the two equations in the model simultaneously. The following binary choice model represents a buyer's decision to leave feedback:

$$Y_i = \begin{cases} 1 & (\text{No Report}), \text{if } Y_i^* > 0 \\ 0 & (\text{Report}), \text{otherwise}, \end{cases}$$

where the latent variable, Y_i^*, represents a buyer's indirect utility from remaining silent. It is estimated by:

$$Y_i^* = \beta_0 + X_{1i}'\beta_1 + \beta_2 X_{2i} + \beta_3 D_{3i} + \beta_4 D_{3i} X_{2i} + \beta_5 D_{5i} + \beta_6 D_{5i} X_{2i} + \varepsilon_i \quad (1)$$

where X_{1i} is a vector of buyer characteristics and auction information, including age (that is the number of days since registered) on eBay, reputation score, positive feedback percentage, number of negative feedback comments received, price, number of bids, and duration of the auction. X_{2i} is an index of the quality of unobserved transactions, either high quality (HQ) or low quality (LQ). If a buyer is satisfied with the seller, then the transaction is HQ and $X_{2i}=1$, otherwise it is LQ and $X_{2i}=0$. D_{3i} is a dummy variable representing whether a buyer is inexperienced or not. If a buyer's reputation score is ≤ 10, he is an inexperienced trader, with $D_{3i}=1$. D_{5i} is a dummy variable indicating whether a seller has left initial feedback. If a seller does not report first, $D_{5i}=1$.

Table 1
Feedback left for sellers.

	+	–	−/+ ratio
Inexperienced buyers	1091	43	0.039
Experienced buyers	2229	73	0.033

[2] The IPod Nano was the third most popular item on eBay during this period.
[3] Researchers including Cabral and Hortaçsu (2010) and Resnick and Zeckhauser (2002) usually consider neutral feedback equal to negative feedback.
[4] See http://pages.ebay.com/help/tutorial/feedbacktutorial/js_tutorial.html.

The latent value of the true binary transaction outcome index, X_{2i}, is estimated from seller characteristics:

$$X_{2i} = \begin{cases} 1 & (\text{HQ}), \text{if } X_{2i}^{*} > 0 \\ 0 & (\text{LQ}), \text{otherwise}, \end{cases}$$

where the latent value of X_{2i}^{*} is estimated by the equation

$$X_{2i}^{*} = Z_i'\alpha + \eta_i. \tag{2}$$

Z_i is a vector of a constant along with characteristics of the seller, including age on eBay and historical feedback profile.

I estimate the coefficients using the maximum likelihood method with the likelihood function

$$L(Y;\theta) = \prod_{Y_i=1} Pr(Y_i = 1) \prod_{Y_i=0} [1 - Pr(Y_i = 1)], \tag{3}$$

where

$$\begin{aligned} \Pr(Y_i = 1) &= \Pr(X_{2i} = 1)\Pr(Y_i = 1 | X_{2i} = 1) + \Pr(X_{2i} = 0)\Pr(Y_i = 1 | X_{2i} = 0) \\ &= \Pr\left(X_{2i}^{*} \geq 0\right)\Pr\left(Y_i^{*} \geq 1 | X_{2i} = 1\right) + \left[1 - \Pr\left(X_{2i}^{*} \geq 0\right)\right]\Pr\left(Y_i^{*} \geq 1 | X_{2i} = 0\right). \end{aligned}$$

The marginal probability for a buyer to remain silent is the product of the probability of reporting conditional on the transaction outcome and the probability of the transaction outcome. Then, I calculate the conditional probability given the transaction outcome of LQ or HQ. When the transaction outcome is LQ,

$$Y_i^{*}|_{X_{2i}=0} = \beta_0 + \beta_3 D_{3i} + \beta_5 D_{5i} + X_{1i}'\beta_1 + \varepsilon_i \tag{4}$$

and when the transaction outcome is HQ,

$$Y_i^{*}|_{X_{2i}=1} = (\beta_0 + \beta_2) + (\beta_3 + \beta_4)D_{3i} + (\beta_5 + \beta_6)D_{5i} + X_{1i}'\beta_1 + \varepsilon_i \tag{5}$$

$$= \delta_0 + \delta_1 D_{3i} + \delta_2 D_{5i} + X_{1i}'\beta_1 + \varepsilon_i \tag{6}$$

I assume the error terms, ϵ_i and η_i, are independent and follow logistic distributions with $F(z) = 1/(1+e^{-z})$.[5] Thus,

$$Pr(Y_i = 1 | X_{2i} = 1) = F(\delta_0 + \delta_1 D_{3i} + \delta_2 D_{5i} + X_{1i}'\beta_1), \tag{7}$$

$$Pr(Y_i = 1 | X_{2i} = 0) = F(\beta_0 + X_{1i}'\beta_1 + \beta_3 D_{3i} + \beta_5 D_{5i}), \tag{8}$$

and

$$Pr(X_{2i} = 1) = F(Z_i'\alpha). \tag{9}$$

Thus, the marginal probability for a buyer to report equals

$$\begin{aligned} \Pr(Y_i = 1) &= \Pr(X_{2i} = 1)\Pr(Y_i = 1 | X_{2i} = 1) + \Pr(X_{2i} = 0)\Pr(Y_i = 1 | X_{2i} = 0) \\ &= F\left(Z_i'\alpha\right)F\left(\delta_0 + \delta_1 D_{3i} + \delta_2 D_{5i} + X_{1i}'\beta_1\right) \\ &\quad + \left[1 - F\left(Z_i'\alpha\right)\right]F\left(\beta_0 + X_{1i}'\beta_1 + \beta_3 D_{3i} + \beta_5 D_{5i}\right). \end{aligned} \tag{10}$$

I substitute Eq. (10) into Eq. (3) and estimate all parameters. Using this empirical model, even though I do not observe the actual transaction quality, I am still able to estimate the parameters of interest. Finally, $\hat{\beta}_4 = \hat{\delta}_1 - \hat{\beta}_3$ is

$$\begin{aligned} &(\textit{an inexperienced buyer's propensity to be silent} - \textit{an experienced buyer's} | HQ) \\ &- (\textit{an inexperienced buyer's propensity to be silent} - \textit{an experienced buyer's} | LQ), \end{aligned} \tag{11}$$

and $\hat{\beta}_6 = \hat{\delta}_2 - \hat{\beta}_5$ is

$$\begin{aligned} &(\textit{a buyer's propensity to be silent when the seller does not report first} \\ &- \textit{his propensity to be silent when the seller reports first} | HQ) \\ &- (\textit{a buyer's propensity to be silent when the seller does not report first} \\ &- \textit{his propensity to be silent when the seller reports first} | LQ). \end{aligned} \tag{12}$$

4. Results

The results in Table 2 show $\hat{\beta}_3$ is positive at the 1% level: inexperienced buyers are more likely to keep silent than experienced buyers when transaction outcomes are LQ. $\hat{\beta}_4$ is negative but insignificant: inexperienced buyers may not necessarily be more likely to be silent when receiving LQ products versus HQ ones, so I cannot identify the nuisance cost as a cost of leaving (negative) feedback. Combining $\hat{\beta}_3$ and $\hat{\beta}_4$, it suggests that inexperienced buyers are more likely to keep silent than experienced buyers in both LQ and HQ cases. Thus, it may not follow that additional nuisance costs make inexperienced buyers more likely than experienced buyers to remain silent in LQ transactions; instead, there may be some unobserved characteristics of inexperienced buyers that make their reporting behavior differ from experienced buyers in both HQ and LQ transactions. $\hat{\beta}_5$ is positive and significant at the 10% level: buyers are more likely to remain silent when sellers do not report first. The effect on buyers' propensity to remain silent when sellers report first is lower for HQ transactions than LQ ones, since $\hat{\beta}_6$ is negative at the 1% significance level.

In this paper, we find that the difference between an inexperienced and an experienced buyer's propensity to remain silent given HQ is *not significantly different* from the difference between an inexperienced and an experienced buyer's propensity to remain silent given LQ (i.e., $\hat{\beta}_4$ is not statistically significant), even though only the inexperienced buyers face an additional nuisance cost to leave negative feedback. Therefore, the nuisance cost may not be a motivation for buyers failing to leave feedback. Moreover, when sellers do not report first, buyers are more likely to remain silent. The

Table 2
Estimation results.

Main variables	Coeff. estimation (std.)
Dummy to indicate inexperienced buyer ($\hat{\beta}_3$)	0.7998 (0.0314)***
Inexperienced buyer × indicator for high quality outcome ($\hat{\beta}_4$)	−0.1602 (0.1303)
Dummy to indicate seller does not report first ($\hat{\beta}_5$)	0.1051 (0.0547)*
Seller does not report first × indicator for high quality outcome ($\hat{\beta}_6$)	−3.3144 (0.1510)***
Control variables	
Item price	−0.0004 (0.0000)***
Auction duration (in minutes)	−0.0001 (0.0000)***
Bid count	0.0074 (0.0027)***
How long the buyer has been on eBay (days)	0.0000 (0.0000)
Buyer's feedback score	−0.0012 (0.0005)**
Buyer's all positive feedback	0.0007 (0.0003)***
Buyer's unique negative feedback	0.0996 (0.0240)***
Buyer's positive feedback percentage	−0.0042 (0.0004)***
Seller's positive feedback percentage	−0.014 (21.144)
Seller's feedback score	0.213 (7.055)
Seller's all positive feedback	0.043 (1.440)
Seller's unique negative feedback	0.802 (27.169)

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively. All numbers are shortened to four digits after the decimal point.

[5] I make this assumption since I cannot observe actual transaction qualities.

buyers' propensity to remain silent, given that sellers do not report, is higher when the outcome is LQ. This suggests that fear of retaliation may discourage buyers from reporting to a greater degree when transaction outcomes are LQ than when transaction outcomes are HQ.

5. Conclusion

This paper's findings on feedback behavior suggest that fear of retaliation through reciprocal negative feedback may be a concern for buyers. This provides empirical support for eBay's May 2008 policy change to ban sellers from leaving negative feedback for buyers.[6] This paper demonstrates that eBay's attempt to solve the fear of retaliation problem in the feedback system is a step in the right direction.[7] More importantly, the paper also shows that nuisance costs may *not* be important. Both findings from real-world evidence are consistent with lab experiments: traders are willing to bear the costs of punishing deviators but are less likely to punish when counterpunishment is possible.

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[6] See http://www2:ebay:com/aw/core/200801290559182.html (accessed on September 28, 2008.)
[7] For more discussion on this policy change, please see Li (2010).