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Can online trading survive bad-mouthing? An experimental investigation☆

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ABSTRACT

Consumer ratings are crucial in creating and sustaining trust and trustworthiness in e-commerce markets. Thus, it is important to know whether online trading can survive bad mouthing among participants. We use controlled lab experiments to test whether market efficiency (measured by the percentage of successful trades) is affected by unfair negative ratings, and whether announcing the percentage of unfair ratings in the market makes any difference. We find that market efficiency is higher when rating information is provided than when no rating information is provided, even when unfair and ambiguous ratings are present. We also find that buyers behave differently when unfair rating information exists; however, no matter whether the percentage of unfair ratings is known, market efficiency is not significantly different from that in the market without unfair ratings.

1. Introduction

Global e-commerce has increased dramatically during the past decade. One important feature of online markets is that traders are usually anonymous and geographically dispersed. This increases the difficulty of legal enforcement of agreements in online markets. Thus, reputation systems have become essential mechanisms to establish and sustain trust among traders [2,4,6,9,14,17,18,21,26].

Given this importance of reputation systems, online markets constantly strive to improve their reputation systems to increase market efficiency, measured by the percentage of successful trades.[1] Nevertheless, unfair rating problems such as bad-mouthing and ballot stuffing still exist [1,4,11]. Sellers may provide good products but receive negative ratings due to factors beyond their control. For example, shipping companies may mishandle the item, buyers may misunderstand the seller's description of the items or be picky about the packaging, or competitors may pretend to be buyers and leave malicious negative ratings to weaken the seller's reputation. Recent empirical studies show that negative ratings have significant impacts on the probability of trade, selling price and profits [1,7,10,19,22,27]. Therefore, it is important to empirically investigate the impact of negative distortions of reputation systems (i.e., bad-mouthing) on market efficiency. To accomplish this task, it is critical to consider the impact of unfair negative ratings on trust and trustworthiness (i.e., buying and shipping behavior in our experimental design) in the market.

We use lab experiments to test whether announcing the percentage of unfair ratings makes any difference in market efficiency. We design four treatments in the experiment: no rating market (NRM), fair rating market (FRM), unfair rating market (URM) and ambiguous rating market (ARM). In the URM treatment, the participants are told the exact percentage of unfair ratings. In the ARM treatment, the participants are informed about the existence of unfair ratings but not the exact percentage of unfair ratings. Thus, the ARM treatment is designed to be closer to reality on eBay or other online markets, and the URM treatment is designed to examine whether telling traders the percentage of unfair ratings would improve market efficiency. NRM and FRM are the control treatments used to identify the impact of rating systems and the impact of unfair ratings, respectively.

Our experiments address a series of research questions. First, we inquire whether a contaminated reputation system that includes unfair negative ratings would still improve market efficiency more than the system with no rating information. We find that market

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[1] For example, in addition to the binary rating system where traders can leave positive, neutral, or negative feedback, eBay introduced a five-star rating systems to give traders more detailed feedback information on their trading partners in 2007. (http://www.auctionbytes.com/cab/abn/y07/m05/i02/s02)

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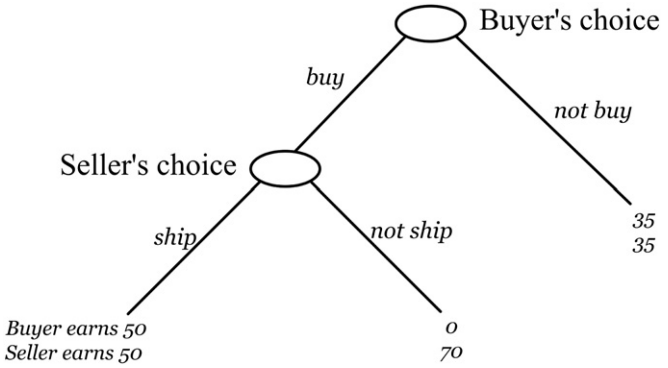

Fig. 1. The trust game.

efficiency improves when rating information is provided, even when unfair and ambiguous ratings are present. Second, we consider whether unfair and ambiguous ratings decrease market efficiency more than in the fair rating case. We show that, given the same rate of positive feedback for the seller, the percentage of buying in unfair and ambiguous markets is higher than in the fair market; however, these differences are not statistically significant. A third important research question is whether providing buyers and sellers the percentage of unfair ratings has any effect on their behavior. We examine this question by comparing the unfair market with the ambiguous market. We show that the previous buying experience has more impact on buyers in the ambiguous market than in the unfair market, especially when the buyer was cheated in the previous round. The seller's behavior in the ambiguous market is not statistically different from that in the unfair market.

This paper contributes to the literature of both reputation systems and experimental economics. First, it is important for researchers and online market providers to know the impact of unfair negative ratings on market efficiency. If the unfair ratings decrease market efficiency dramatically, then we need to design mechanisms to solve for the problem. If traders can self-adjust their beliefs about shipping in the market and efficiency is not affected much, then there is less need to worry about unfair ratings in reputation systems. Second, since it is difficult to acquire field data on unfair ratings, we use controlled lab experiments to address the questions. From an empirical perspective, this paper provides experimental evidence that highlights the effect of knowing the percentage of unfair ratings on market efficiency. Our experiment data show that knowing the percentage of unfair ratings has an impact on buyers' behavior, but, more interestingly, it does not make any difference in market efficiency. This suggests that traders can always adjust their expectations well to the markets, and the reputation systems still work.

The remainder of the paper is organized as follows. Section 2 introduces the related literature and presents behavioral predictions.

Table 1
Abstract terms used in experiment.

Terms used in experiment	Meaning
The first mover	The buyer
The second mover	The seller
Choice A	Not to buy
Choice B	To buy
Choice C	Not to ship
Choice D	To ship
Label X	Negative rating
Label Y	Positive rating
The probability of mislabeling Y with X	Negative unfair rating

Table 2
Buying and shipping rates, by treatment.

Treatment	Sessions	Buying rate	Shipping rate	Market Efficiency
No rating market	3	.402 [.491] (720)	.333 [.484] (289)	.149 [.357] (720)
Fair rating market	4	.622 [.485] (960)	.729 [.432] (597)	.467 [.500] (960)
Unfair rating market	4	.628 [.484] (960)	.645 [.497] (603)	.430[.497] (960)
Ambiguous rating market	4	.623 [.485] (960)	.644 [.466] (598)	.425 [.495] (960)

Standard errors are in brackets. The number of observations in each cell is in parentheses.

Section 3 reports the experimental design. Section 4 analyzes the results, and Section 5 concludes.

2. Related literature and behavioral predictions

Reputation systems have been used to establish and ensure trust and trustworthiness in markets since the Middle Ages [17,20]. Through the years, as markets have changed, so has the ability for traders to build trust. This became more complicated, as buyers and sellers no longer needed to meet face-to-face to do business. The Internet makes it easier for people who are separated by long distances and have never met before to trade. Legal enforcement is difficult, therefore online markets have developed reputation systems in which buyers and sellers leave feedback. These systems play an essential role in building trust and trustworthiness in the online market, and thus are crucial to sustaining market efficiency.

Much literature shows that a seller's reputation has an effect on her probability of sale and price, especially negative ratings [1,7,10,21]. As reported by Cabral and Hortascu [7], a 1% increase in negative ratings causes a 7.5% decrease in prices; after an online seller receives her first negative rating, her weekly sales rate drops from a positive 5% to a negative 8%; an online seller's next negative rating arrives 25% more rapidly than the first one. Other than not sending the promised products, sellers may also get negative ratings due to factors beyond her control, such as problems created by the shipping companies, unreasonable buyer expectations, or malicious negative ratings from competitors. The negative ratings due to these factors are considered unfair negative ratings. Dellarocas [13] points out that the incidence of unfair negative ratings hurts market efficiency because sellers may be induced to be less trustworthy when unfair negative ratings are present.

Researchers have designed various mechanisms to solve the unfair rating problem. Conte and Paolucci [9] examine the social cognitive factors of unfair ratings. Whitby et al. [26] use a statistical filtering technique to exclude unfair ratings in Bayesian reputation systems. Dellarocas [11] proposes using controlled anonymity to avoid unfair negative ratings, and Miller et al. [21] design truth-eliciting mechanisms to promote truthful reports. Researchers also use lab or field experiments to explore various mechanisms to improve the current reputation systems [5,6,15]. However, there is limited empirical evidence on the impact of unfair negative ratings on market efficiency and whether traders can adjust.[2]

Using lab experiments, Du and Huang [14] show that market efficiency is not significantly different between a fair rating market and an unfair rating market where traders are informed about the percentage of unfair negative ratings. However, in real online markets, it is almost impossible for traders and market managers to know the exact percentage of unfair ratings in the market. Therefore, to make the

[2] Rice [23] also uses lab experiments to study reputation and uncertainty in online markets, but she manipulates the payoffs. In our paper, we directly manipulate the reputation scores. Rice [23] uses a subjective reputation system while we use an objective reputation system for better control.