

## **Reputation Formation in On-line Markets: A Laboratory Study**

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One of the definitive characteristics of electronic markets is the information asymmetry that exists between buyers and sellers. Sellers have an information advantage over buyers, as only sellers know their type with certainty. Moreover, buyers do not know the true quality of the goods and services being offered and must rely on the sellers descriptions of their products. It has been shown that the absence of an enforcement mechanism in markets with information asymmetry can lead to moral hazard problems and adverse selection. To address the asymmetry in online markets many e-commerce sites feature public on-line reputation systems where trading partners may leave feedback and comments about prior transactions. The result is an electronic reputation system that evolves from third party reporting, where an individual submits information on-line about a transaction partner and this information can be accessed by other community members wishing to evaluate that individual. The hope is that these electronic reputation systems can substitute for reputations that would otherwise be established through repeated interaction and provide an incentive for buyers and sellers to cooperate in spite of the inherent information asymmetry. Such hopes are well founded as there is evidence that reputation can serve as an effective enforcement mechanism to lessen moral hazard problems (Kreps 1982) and that electronic reputation systems can mitigate the threat of adverse selection, build trust, and align incentives leading to greater profits for buyers and sellers (Dewan and Hsu 2000; Ba and Pavlou 2001; Schwartz, Young, Zvinakis 2002; Resnick and Zeckhauser 2002; Dellarocas 2003; Bolton, Katok, Okenfels 2005; Bolton, Katok, Okenfels 2006).

In on-line communities a reputation is the history of reported evaluations left by prior transaction partners. This information is then disseminated to the community and helps members evaluate an individual's expected probability of future cooperation. Sites such as Ebay allow buyers and sellers to be assigned a reputation score tabulated from all past ratings, thus

reputations are a direct measure of the ratings assigned by other community members (Resnick and Zeckhauser 2002). By conducting a controlled study to gain understanding into how these ratings are assigned we provide insight into reputation formation in on-line markets. Admittedly our context is constrained and ideally it would be valuable to use empirical data to measure reputation ratings after transactions about which we have perfect information regarding product quality and the process of the transaction. Unfortunately these characteristics are unobservable and/or subjective, thus we utilize a controlled economic experiment where individual valuations are induced (Smith 1976) and expectations are established in advance. Because we are interested in the relationship between trust, reciprocity, and reputation formation we utilize a trust game with a reputation system to explore the behavioral effects of third party reporting systems in a context where trust and reciprocity can be manipulated and measured.

This study contributes to prior work on the effects of reputation by exploring the important question of how reputations are formed in on-line environments, and how specific reputation information is utilized in the on-line environment. We conduct a series of laboratory experiments in which subjects interact in an on-line market setting. Our design is a modified investment game where one player is given an endowment which can be “invested” and sent to another player. This investment is increased by a designated amount, after which the second player decides how much of this amount to return to the first player. At the conclusion of the exchange players are asked to rate their partner. Because on-line markets can have a higher level of uncertainty than offline markets we design a treatment to investigate the directional effect of uncertainty in this setting. Specifically, we impose a treatment where there is a thirty percent chance that the amount returned by the second player can be intercepted and reduced to zero.<sup>1</sup> Under these conditions when the first mover receives nothing in return it is not known whether this was intended by the second mover or if the returned amount was intercepted.

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<sup>1</sup> We chose a high probability of interception for this treatment in order to measure directional effect of uncertainty. Further extensions include varying the levels of uncertainty to more thoroughly investigate this element of the transaction.

Questions fundamental to this work are as follows: (1) How are on-line reputations formed in anonymous transactions? (2) What are the economic and behavioral effects of different reputation information?

We analyze the effects of different types of reputation information and find noteworthy differences. Specifically, the aggregate of an individual's good ratings had a positive effect on investment decisions, while a single good reputation rating assigned in the prior round had no effect. Also, the aggregate of an individual's poor ratings was not significant in the investment decision; however a single poor rating had a negative effect in the subsequent round. This finding shows that the two types of reputation information are weighted differently and the perception of a good or a poor rating differs depending on whether it is reported in the aggregate or as an individual score.

We also find that average reputation ratings were more positive in the treatments where uncertainty was exogenously imposed than in the treatments without this additional uncertainty. Specifically, in treatments where interception was possible subjects were less willing to punish their partner with a poor reputation rating when it appeared they had returned less than what was promised. When it was unclear whether a poor outcome was intended or a result of the exogenous interaction subjects were more willing to give the benefit of the doubt and not punish with a poor reputation rating. Moreover, when uncertainty was greater buyers exhibited more trust than in settings without the imposed uncertainty.

These findings contribute to the academic literature by being one of the first to demonstrate in a controlled setting how on-line reputations are formed and interpreted, and how uncertainty impacts this process. The results of this work can also aid in reputation mechanism design and assessing acceptable levels of uncertainty in the system. As removing all uncertainty in third party reporting is likely impossible and/or cost prohibitive, understanding how remaining uncertainty impacts the system can prove beneficial to design efforts.

NOTE: This work is undergoing a first round of revisions for *Information Systems Research*.