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RETURNS TO REPUTATION IN ELECTRONIC MARKETS: AN EXPERIMENTAL STUDY

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Abstract

Electronic markets are prone to informational asymmetries wherein one party knows more about the transaction than another. This might lead to a loss in market efficiency and a market failure. Reputation mechanisms, such as a feedback rating mechanism in which each buyer provides feedback about sellers is one way to minimize potential failure. The impact of a reputation mechanism is difficult to assess in natural markets or even field experiments, because several variables of interest are not under the control of the researcher. In this study, we use experimental economic methods, specifically the induced value theory, to control for buyer and seller values and study the impact of the reputation mechanisms on market efficiency and price premiums.

Keywords: Electronic markets, trust, reputation

Research Objectives and Questions

Electronic markets may be defined as virtual trading arrangements involving many buyers and many sellers. Markets in general and electronic markets in particular are prone to informational asymmetries among buyers and sellers. As an example, consider a market in which sellers have some private information about the quality of a good (e.g., a used car) and buyers are not aware of product quality until after purchase. In such a case, there is an information asymmetry, i.e., the seller knows something about product quality while the buyer does not. The well-known "lemons argument" suggests that, in the presence of information asymmetries, the market fails to achieve an efficient equilibrium (Akerlof 1970). From a societal point of view, this loss of market efficiency is undesirable, because it prevents execution of voluntary trades that make both buyers and sellers better off.

One way to reduce information asymmetries in such markets is to enable buyers and sellers to build reputations. For example, buyers could provide a feedback rating for each seller for each transaction with the feedback made publicly available for all future buyers. Electronic market environments also allow participants to provide informal comments or signals about other participants. Whether and to what extent such mechanisms help improve market efficiency is an important question for electronic commerce (Ba and Pavlou 2002; Resnick et al. 2003).

Assessing the impact of mechanisms in naturally occurring markets is nearly impossible, due to a lack of control over several important variables affecting the outcomes. The most important of these variables may be a buyer's willingness to pay (WTP) and a seller's willingness to accept (WTA). We build an experimental electronic market (i.e., a software implementation) so as to control for a large number of noise variables typically present in a natural market environment. We use systematic procedures to induce values among market participants, using induced value theory from the field of experimental economics.

The objectives of this research are to assess the impact of the feedback mechanism on (1) market efficiency, and (2) price premiums. Two significant contributions to the IS literature are expected from our work. We use methods developed in experimental economics to induce values (i.e., WTP and WTA and, therefore, demand and supply curves) so that the impact of

a reputation mechanism on market efficiency and price premiums can be studied under controlled conditions. Second, we operationalize and test the impact of the social network of a seller on reputation and price premia.

Theoretical Foundations

Considerable work, mostly unpublished, has been done regarding the impact of reputation systems used in eBay-like environments and its effect on prices. Resnick et al. (2003), in a working paper, summarize 12 such studies and state that (p. 7): "Their results are highly inconsistent, producing vastly disparate findings on the main question, the effects of reputations. Moreover, a few of the studies have serious flaws in either methods or analysis." They further suggest that, "Given that the results clash, some are likely to prove spurious. It is useful, however, to explore the design space of such experiments, to understand the power and limitations of work to date, to frame our own experiment, and to help serve as a guide for future work." In their experiment, they enhance experimental control by using a matched sample of sellers—an eBay auctioneer with a high reputation and another with little reputation.

The issue of design space of experiments proposed by Resnick et al. is an important one. Smith (1982), in his classic paper detailing how microeconomics could be an experimental science, traces the history of methods used by economists and finds that, over time, the study of naturally occurring phenomena was improved by using field studies that allow for some control over the source of the phenomena (see pp. 929-930). Smith proposes the use of controlled laboratory experiments with induced values, as a natural evolution of field experiments. IS researchers studying the interplay of ecommerce and markets could also benefit by including controlled laboratory experiments with induced values in their design space.

Brief Review of Induced Value Theory

Creating experimental electronic markets to test theory is considerably eased by techniques developed in experimental economics. We focus here on induced value theory, an important component of experimental economics and not commonly used in related IS research. Induced value theory assumes that subjects in an experiment have preferences, which could be modified by inducing appropriate values through a *reward medium* (e.g., cash payments tied to performance on the experimental task). The reward medium is used to induce simple values (e.g., willingness to pay for a fictitious good in a buyer, willingness to accept in a seller) and compound values (e.g., supply curve, demand curve).

Smith defined a list of five *precepts* in induced value theory. These are nonsatiation, salience, dominance, privacy, and parallelism. Nonsatiation, sometimes referred to as monotonicity, suggests that in the suitable reward medium, more should always be better (or less should be always worse). Salience means that the reward corresponds to a clear outcome function such as profit or utility. Dominance implies that the reward structure dominates any subjective costs (or values) associated with participation in the activities of an experiment. Privacy requires that each subject in an experiment be given information only on his/her own payoff alternatives. This helps control for inter-agent payoff externalities. Parallelism is essentially the same as external validity in experimental design and is necessary in generalizing the findings from the experiment to the real world. Experiments designed according to the first four precepts above can display high replicability (internal validity).

The Experimental Market Design

We use a simple posted-price institution in which sellers post prices (rather than an auction institution—hence, this design is not strictly comparable to prior work on eBay-like environments). The specific institution should be viewed as a treatment variable, but it is not varied in our current experiment. For inducing values among subjects, we use the task parameters used earlier by Cason and Gangadharan (2002), after suitable modifications. The two main changes we make are a small payment when subjects don't buy (called no_buy_payment) so as to avoid perverse incentives, and (2) subjects are paid based on their performance for one of the randomly chosen periods, which is decided after the experimental session. This helps control for wealth effects.

Briefly, our experimental design uses two control conditions and five experimental treatments, for a total of seven planned treatments. A given treatment requires subjects to trade for a fictitious good in an electronic market. Appropriate values (willingness to pay in buyers, willingness to accept in sellers) are induced using a reward medium that has a well-defined mapping to cash that subjects could earn. Subjects acting as sellers post prices and other subjects, acting as buyers, decide whether or not

to purchase at the posted price. Each treatment runs for a maximum of 20 such trading periods. The transaction data generated by subjects will be analyzed to:

- assess market efficiency, by period and by treatment
- assess the impact of treatments on prices posted by sellers in each period
- assess the impact of treatments on buyer purchase prices in each period and across periods

Table 1 summarizes the treatments and presents a subset of hypotheses dealing with market efficiency. Market efficiency is computed as follows: a theoretical measure of market efficiency is the total surplus, defined as the difference between willingness to pay and willingness to accept, aggregated across the market. Since willingness to pay and willingness to accept are constants, set by the experimenter, it is possible to calculate a numerical value for theoretical total surplus. Each treatment changes the market rules slightly and therefore, yields a total surplus no larger than the theoretical surplus. Therefore, the market efficiency of a given treatment, a number between 0 and 1, is computed as

Market efficiency = Total surplus under treatment /Theoretical total surplus

Table 1. Treatments and Hypotheses (Market Efficiency)

Label	Control/Treatment	Description of Treatment	Comments/Hypotheses
E0	Full information condition (***Control condition***)	Sellers post prices and grades. Seller identity and grade information is revealed. Seller costs and buyer values are private information.	Market will be 100% efficient, i.e., all surplus will be realized. This represents the ceiling.
E1	Lemons condition (***Control condition***)	Sellers post prices. No grade information is posted. Seller identity is not revealed.	Standard lemon's condition. Market efficiency will be fairly low. This represents the floor.
E2	Identity condition	Sellers post prices and their identity is revealed.	Efficiency ranking: E0 > E2 > E1.
E3	"Cheap talk" signaling	Sellers post prices but identity not revealed. Instead, each seller can make claims about their product, which are displayed in text format.	E0 > E2 > E3 ~ E1
E4	"Cheap talk" and identity	E3 with seller identity revealed.	E0 > E4 ≥ E2 > E3 ~ E1
E5	Feedback ratings – 1	E2 and feedback rating history revealed	E0 > E5 > E4 ≥ E2 > E3 ~ E1
E6	Feedback ratings – 2 (Alternate format of feedback)	New feedback format uses a network representation to display the "social network" of a buyer/seller from previous transactions (based on Granovetter's (1985) notion of "weak ties" and under development).	E0 > E6 > E5 > E4 ≥ E2 > E3 ~ E1

The final treatment, labeled E6, is designed to test the idea that reputation can be formed not only through direct experience but also through indirect connections (links, ties). We use an informal version of the balance theory, which comes from Sociology (Davis 1970; Heider 1958). The theory states that people organize their perceptions about objects/persons and strive for consistency in the positive and negative feelings. We operationalize a measure of such links and assess their impact on reputation formation and price premia.

Table 2 summarizes the experimental procedure.

Table 2. Experimental Procedure

Begin Treatment
Set treatment level parameters
Begin period
Set per-period payments and other period level parameters

Step 1: Each Seller decides how many units to sell, the quality grade for the items, and an ask price for each item

Step 2: Begin
- Randomly pick a buyer
- Buyer makes a decision (number of items to buy, seller from whom to buy)
- If No Buy, then award a ***no_buy_payment*** to buyer, If Buy, then determine payments using treatment-level parameters

Repeat until no buyer left

Save the period data
Repeat for 20 periods
Save treatment data
Choose ONE of the periods randomly and make cash payments to subjects
Repeat/Next Treatment

Current Status

We are currently in the process of setting up and running the experiments. We are confident that we will be able to present the results of the experiment at the conference.

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