

The Effect of Identity Disclosure on Reliability and Efforts Provision in Online Review Systems

Emergent Research Forum Papers

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Abstract

As consumers rely on online customer reviews to assess the quality of products, firms often try to manipulate the reviews to attract consumers. If review sites fail to maintain reliability, firms are less likely to be motivated in improving quality of products. To alleviate fakery, online review providers have designed several identity disclosure mechanisms. The purpose of this research is to explore the role of identity disclosure on (1) reliability of online review systems and (2) subsequent efforts provision. We employ an incentive-aligned laboratory experiment based on a simple model of review systems. As theory of social pressure predicts, our results show that identity disclosure hurt the reliability of review systems, but not necessarily efforts provision. The current paper is a research in progress that aims to better understand the role of identity disclosure in online review systems.

Keywords

Evaluation systems, identity disclosure, behavioral economics, experimental economics, social pressure.

Introduction

Online customer reviews have been considered an important source of information to assess the quality of products. Prior studies (Chevalier and Mayzlin 2006; Luca 2011) have shown that online reviews affect product sales across industries. Due to their importance, vendors often try to manipulate the reviews to pretend as they received great feedbacks, hurting reliability of the review sites (Trenz and Berger 2013). If the review sites fail to maintain reliability in providing honest feedback about the quality of products, firms are less likely to be motivated to invest efforts in improving their products.

Identity disclosure of online users is one potential way to enforce the reliability of online reviews (see Villasenor 2014). To alleviate fakery, online review providers have designed several identity disclosure mechanisms. Some providers (e.g., Yelp, Amazon) offer a choice to voluntarily reveal the identity. Others (e.g., Airbnb, Google) enforce all online users to reveal their identity. Though online review providers expect that identity disclosure will ensure honest feedback from online users, the impact of identity disclosure on review reliability received limited attention and it is, as a result, controversial. On one hand, revealing identity would make online users feel responsible for their comments and leaving fake reviews would hurt their reputation. On the other hand, revealing identity may discourage users from giving an honest (negative) feedback especially when their comments could encounter legal and financial burden. Villasenor (2014) argues that people take fewer risks when their identities are known. If consumers avoid posting honest negative feedback, identity disclosure will eventually hurt the reliability.

The purpose of this research is to explore the role of identity disclosure on (1) reliability of online review systems and (2) subsequent efforts provision. We employ an incentive-aligned laboratory experiment based on a simple model of review systems. A unique aspect of our experiments is that we directly observe efforts decision by participants. This allows us to empirically test the effect of identity disclosure. Overall, we expect our study to offer insights for reliability of online review systems and efforts provision by identity disclosure.

Research Background

Mudambi and Schuff (2010) defines online customer reviews as *peer-generated product evaluations* posted on online review sites. Prior studies examined whether identity disclosure leads to reliable outcomes and improved quality in outputs. Blank (1991) showed that reviewers become more critical when their identity is hidden. McNutt et al. (1990) and Justice et al. (1998) found that hiding identity leads to slight improvement in perceived quality. Corgnet (2012) and Blank (1991) showed that existence of social relationship lowers reliability of evaluation process. Forman et al. (2008) argued that identity disclosure increases consumers' perception about reliability. However, previous studies do not observe efforts, but perceived outcomes. Therefore, they cannot offer conclusive insights about empirical relationship between identity disclosure and the reliability of evaluation systems as well as subsequent efforts investment.

To study the impact of identity disclosure, it is necessary to understand how it affects an individual's social aspects. Villasenor (2014) says people want to be perceived positive, not negative, by others. According to the theory of social pressure, people care about their self-image just as they care about opinions of others toward themselves (Batson 1998; Freeman 1997). Thus, people often choose to do actions beneficial to others when their behaviors can be seen by others (Benabou and Tirole 2005). Applying such social aspects, this research follows recent studies that employ incentive-aligned experiments to test theories based on social/behavioral perspectives (Lim and Ho 2007; Lim 2010).

Theory

Peer Evaluation Game

Following that online review system is a type of peer evaluation (Mudambi and Schuff 2010), we design a simple model of *peer evaluation game* where firms are competing where their shares are determined by reported scores from online users.

The game consists of the following steps:

- 1) Player i chooses an effort e_i which ranges between $e_{min}=1$ and $e_{max}=15$. Player i incurs a decision cost $c(e_i)=ke_i^2$. That is, as high e_i is chosen, decision cost increases at an increasing rate.
- 2) Next, a reviewer j is assigned to the player i and observes the effort e_i . Then, the reviewer j assigns a score s_i , which ranges between $s_{min}=e_{min}$ and $s_{max}=e_{max}$ to player i .
- 3) At last, player i 's profit is determined as $\pi_i = s_i / (\sum_{i' \in \{i, -i\}} s_{i'}) \times P - c(e_i)$.

Note that the reviewer j does not compete with the player i for the pie P . Also, the score assigned by the reviewer does not need to be the same as the effort chosen by the player. However, the reviewer knows that the player incurs high costs by choosing high efforts.

Theoretical Prediction

Based on the proposed model, a participant's behavior (i.e., efforts provision) can be predicted based on belief on reviewer's reporting. Because player j 's payoff is not affected by reported score s_i to player i , reviewers do not have any incentive to inflate/deflate scores. Then, players will expect that reviewers report the score correctly (i.e., correct-reporting). We assume that players believe that reviewers will report scores as same as efforts ($s_i=e_i$).

Proposition 1. *Players believe that reviewers report an objective score, which is the same as efforts chosen.*

Following Proposition 1, we solve for a pure-strategy subgame perfect Nash equilibrium (NE). The expected profit of player i is defined on Equation (1).

$$E\pi_i = \frac{Es_i}{Es_i + Es_{-i}} \times P - c(e_i) = \frac{e_i}{e_i + e_{-i}} \times P - c(e_i) = Pe_i(e_i + e_{-i})^{-1} - ke_i^2 \quad (1)$$

Given the effort by counterpart $-i$, player i 's efforts to maximize own payoff should be the solution of Equation (2).

$$\frac{dE\pi_i}{de_i} = P(e_i + e_{-i})^{-1} - Pe_i(e_i + e_{-i})^{-2} - 2ke_i = 0 \quad (2)$$

The best response for player i 's efforts e_i^* , given counterpart's efforts e_{-i} , is the solution from Equation (2). We further refine NE by employing a symmetric pure-strategy ($e_i^* = e_{-i}^*$). Then, we infer the following equilibrium efforts:

$$e^* = \sqrt{\frac{P}{8k}} \quad (3)$$

On the other hand, social pressure suggests that people have an intrinsic opinion to be nice under presence of social pressure (Batson 1998; Benabou and Tirole 2005; Freeman 1997). Unless being nice hurts own utility, reviewers will inflate participants' scores (i.e, over-reporting). Thus, we assume that rational players believe that reviewers will report high scores regardless with efforts ($s_i = s_{max}$).

Proposition 2. *Players believe that reviewers report a high score, regardless of efforts chosen, under presence of social pressure.*

Following Proposition 2, player i 's score s_i is determined as s_{max} , not depending on player's effort e_i . We infer the following NE efforts:

$$\begin{aligned} E\pi_i &= \frac{Es_i}{Es_i + Es_{-i}} \times P - c(e_i) = \frac{1}{2} \times P - ke_i^2 \\ \frac{dE\pi_i}{de_i} &= -2ke_i = 0 \\ e^* &= e_{min} \end{aligned} \quad (4)$$

Overall, identity disclosure will raise social pressure, leading to over-reporting behavior of reviewers. We argue that players rationally expect the reviewers' behavior and, thus, invest NE efforts as predicted. Thus, we propose the following hypotheses:

H1: *Under identity disclosure, reviewers tend to over-report scores if social pressure from identity disclosure is sufficiently strong.*

H2: *Under identity disclosure, players choose lower efforts if players rationally expect reviewers' behavior.*

Experimental Results

Design and Procedure

We test two "social conditions" *Anonymous* vs. *Identity* disclosure (*anonymous*: participants do not know each other; *identity*: participants were first asked to introduce themselves before experiments and, during the experiments, participants were shown name of their reviewer on the computer screen and vice versa). In addition to social condition, we introduce "repeated matching" (*1-round*: matching of counterpart and reviewer changes every round; *3-round*: each participant will be matched with the same counterpart and the same reviewer for three consecutive rounds) as another dimension to compare the effect of short-term and long-term social pressure. Employing 2x2 design, our experiments consist of four treatments, varying in two dimensions.

Parameters used are $P=120$, $k=0.15$. NE prediction is $e^*=10$ under correct-reporting (Proposition 1) and $e^*=1$ under over-reporting (Proposition 2). Expected profit is $\pi^*=45$ and $\pi^*=59.85$, respectively. Experiments were implemented using z-Tree software (Fischbacher 2007). Participants of experiments consist of 108 undergraduate students at a large public research university in the United States. For

Anonymous 1-round treatment, we conducted three experimental sessions. Each of the rest three treatments consisted of two sessions. Each session had 12 participants with 15 decision rounds. Subjects received a course credit and cash payment based on their results of the game.

Reporting Behavior

For reliable evaluation systems, reported scores should reflect the actual efforts correctly. For each observation, we calculated the difference between received reported number (i.e., score) and efforts chosen. If the difference is over zero, player's score is inflated (over-reporting). If negative, the score is deflated (under-reporting). Otherwise, correctly-reported. The proportions of under-, correct-, and over-reporting occurrences for each treatment are reported on Table 1.

Reporting behavior	<i>Anonymous</i>		<i>Identity disclosure</i>	
	1-round	3-rounds	1-round	3-rounds
Under-reporting	27.41	21.11	11.11	5.83
Correct-reporting	41.67	59.17	24.72	21.67
Over-reporting	30.93	19.72	64.17	72.50

Table 1. Proportions of Reporting Behaviors

In *Anonymous*, correct-reporting is most frequently observed at 42% (1-round) and 59% (3-round). In *Identity*, over-reporting accounts for more than 64% and 72%, respectively. The findings in reporting behaviors are in line with our expectation as shown on Propositions 1 and 2. That is, when identity is revealed, reviewers feel social pressure to be nice toward players. Therefore, evaluation systems are considered less reliable because it fails to reflect the true efforts.

Another finding is that reporting behavior seems strengthened for a longer period of matching. Repeated matching seems to make reviewers form a stronger social pressure. For example, higher proportion of over-reporting in *Identity 3-round* suggests an increased social pressure due to expectation of a long-term relationship between reviewers and players.

Efforts Provision

We argued that players form a belief about reviewers' behavior, eventually affecting their efforts provision. To understand what belief players form and how they react accordingly, we focus on efforts provision.

Variable	Anonymous setting		Identity disclosure	
	1-round	3-round	1-round	3-round
Average Efforts	7.3 (4.11)*	7.6 (4.28)	8.2 (3.85)	5.6 (4.54)
Median Efforts	8.0	8.0	8.0	5.0
Average Score	7.5	7.6	11.4	11.7
Median Score	8.0	8.0	14.0	15.0
<i>N</i>	540	360	360	360

* Number in parentheses are standard deviation.

Table 2. Summary Statistics of Efforts and Scores

Table 2 reports the summary statistics. Median efforts from four treatments are all lower than that of standard economics prediction (assuming objective-reporting, $e^*=10$). This suggests that players suspect reliability of evaluation systems. For *Anonymous 1-round* and *3-round* where correct-reporting is observed at a high rate, the median efforts are both 8. This high median efforts imply that players in anonymous settings generally hold a stronger belief that evaluation systems are still reliable at some extent.

Surprisingly, for *Identity 1-round* where scores are mostly inflated, the median effort is still 8. The average effort is at 8.2, even higher than both *Anonymous* treatments (7.3 and 7.6). This finding suggests a gap between players' belief and reviewers' behavior. While reviewers feel strong social pressure by revealing identity, players doubt that social pressure of reviewers will be enough to be nice. However, such doubt disappears when players recognize a long-term relationship. For *Identity 3-round*, the median and average efforts decrease into 5 and 5.6, respectively, the lowest level among all treatments.

Variable	Coefficient	Robust SE	t-stat.	p-value
Constant (base=<i>Anonymous 1-round</i>)	7.276	0.476	15.290	0.000
<i>3-round</i>	0.296	0.753	0.390	0.695
<i>Identity disclosure</i>	0.874	0.669	1.310	0.194
<i>Identity disclosure</i> × <i>3-round</i>	-2.863	0.978	-2.930	0.004

#obs.=1620, #clusters=108, R²=0.0443

Table 3. OLS-Regressions on Efforts

Table 3 compares the average efforts among treatments. We clustered standard errors at the subject level in analysis. Regression results suggest that difference in the average efforts among three treatments (*Anonymous 1-round* and *3-round*, and *Identity 1-round*) is not significant. But, the mean effort in *Identity 3-round* is significantly lower. Although identity disclosure itself hurts the reliability, players' investment in efforts will not be affected unless players expect a long-term relationship with the reviewers.

Conclusion and Future Plans

This research has several important theoretical and practical contributions. First, this is the first to observe efforts provision in the context of evaluation systems. Prior studies mostly focused on change of perceived outcomes in evaluation systems. Second, we found that the influence of identity disclosure hurts the reliability of evaluation systems as social pressure suggests (Batson 1998; Benabou and Tirole 2005; Freeman 1997), but not necessarily the efforts provision. Third, this research extends a series of literature employing social preference in understanding various consumer behaviors (Lim and Ho 2007; Lim 2010).

Although the current research pointed out several interesting findings, this research is still in progress. Our goal is developing a behavioral economic models that capture players' behavior in full. Our current theoretical model does not explain/predict two findings. First, efforts provision should be driven by players' belief on reviewers' social pressure. Following recent studies incorporating bounded rationality into models (Ho et al. 2006; Ho and Su 2009), we will introduce a behavioral parameter that captures players' belief. Overall, our findings help in developing a behavioral model to fully understand the role of identity disclosure in evaluation systems, which will offer insights in designing optimal online review systems.

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