Abstract

User-generated content (UGC) has become increasingly important in both individuals’ daily life and business application. To encourage contributions, online platforms have utilized completion-contingent monetary incentives, wherein financial rewards are equally offered to each contributor who successfully completes a specific task. However, recent studies find that completion-contingent monetary rewards increase the volume of UGC at the expense of the compromise on quality. In this study, we use a natural experiment research design to investigate the effect of an alternative reward structure, performance-contingent monetary incentives, on UGC generation. Since performance-contingent incentives are only rewarded to owners of high-quality content, this design may crowd in individuals’ intrinsic motivation via enhancing their perceived competence, and therefore stimulate their contribution of more content without compromising on quality. This research will advance our understanding of how different monetary incentive policies influence UGC contribution in online communities.

Keywords

Online reviews, User generated content, Monetary incentives, performance-contingent incentives

Introduction

The last decade has witnessed a remarkable growth of user-generated content (UGC). Given its essential role, platforms have attempted to motivate individuals to generate a larger volume of useful content through monetary incentives. The most commonly employed approach is to provide a small payment based on the quantity of the content, which is called completion-contingent monetary incentives. Unfortunately, this method turns out to backfire, since the incentives tend to increase UGC’s volume at the cost of its quality (e.g., Burtch et al. 2017; Khern-am-nuai et al. 2018). With the downside of completion-contingent monetary incentives, we are asking the following research question: is there an alternative monetary incentive design that encourages more UGC activities without undermining its quality? One of the potential options is the performance-contingent monetary incentives, which only compensate owners of high-quality content. Such design may enhance people’s intrinsic motivation by signaling his/her inherent capability in the related area, therefore ensuring the content quality. In this research, we are among the first to empirically investigate how performance-contingent monetary incentives affect the quantity and quality of UGC contribution. We utilize a unique dataset provided by an online restaurant review platform in Asia that adopted a performance-based monetary incentives scheme to reward high quality contributors. We treat this incentive program as a natural experiment and leverage propensity score matching (PSM) and difference-in-differences (DID) approach to estimate the causal impact of performance-contingent monetary incentives on review generation.
Brief Survey of Literature

An emerging stream of literature in information systems (IS) and marketing examines the impact of completion-contingent monetary incentives on UGC contribution, (e.g., Burtch et al. 2017; Khern-am-nuai et al. 2018; Wang et al. 2016). Consistently, these studies find that completion-contingent monetary incentives are effective in stimulating the volume of UGC, but unsuccessful in improving content quality that is usually measured by content length and the number of helpfulness vote. For example, using a natural experiment design and difference-in-differences (DID) analysis, Khern-am-nuai et al. (2018) find that the number of customer reviews on the review platform adopting a completion-contingent monetary incentives program increases significantly compared to a control platform without providing any monetary incentives. However, the average review quality (e.g., both review length and the number of helpfulness votes) significantly decreases. In addition, rather than facilitating capturing all kinds of opinions across the rating spectrum, monetary incentives lead to severer bias towards positive ratings. Wang et al. (2016) also conduct a quasi-experiment at product level and find that completion-contingent monetary incentives are conducive to stimulating larger volume of reviews but have no significant impact on review helpfulness. Meanwhile, experimental studies document similar results as well. For instance, in their randomized experiments, Burtch et al. (2017) find that financial incentives encourage people to write larger volumes of reviews but exert no influence on review length. In sum, completion-contingent monetary incentives usually lead to more content output with inferior quality, and are accompanied by other undesirable results, such as sentiment bias.

Both economic and psychological literature provides theoretical explanations for these results (Frey and Oberholzer-Gee 1997; Gneezy and Rustichini 2000). According to basic assumptions of economic theory, rational individuals are driven by utility so that they decide their effort allocation according to the amount of compensation (Gneezy and Rustichini 2000). In the context of completion-contingent monetary incentives, people can earn the compensation as long as they generate content regardless of the quality. Rational reviewers would write more reviews by exerting minimal level of effort for each to maximize their utility. Therefore, we observe that the quantity of reviews increases but the quality decreases. Cognitive psychological literature also suggests a negative effect of external incentives on content quality. According to Cognitive Evaluation Theory (CET) (Deci et al. 1999; Deci and Ryan 1975), people have intrinsic motivations independent from external incentives when performing a task. Moreover, intrinsic motivation can be crowded out by extrinsic reward, leading to reduced effectiveness of intrinsic motivation and a potential negative net effect on performance eventually. In the presence of completion-contingent monetary incentives, people’s intrinsic motivation to help others is crowded out so that they write reviews mainly for the rewards. Additionally, completion-contingent monetary incentives could attract new reviewers who are not intrinsically motivated previously, indicating that they are predisposed to exert little effort in generating helpful reviews, ultimately undermining review quality.

These disappointing results call for more explorations for alternative monetary incentive designs. While one laboratory-based experiment demonstrates that performance-contingent incentives may improve UGC quality (Wang et al. 2012), it is crucial to study the impact of this incentive scheme on other important variables such as review quantity and valence. Also, the lack of empirical evidence in a more realistic setting makes it difficult for business managers to infer how this design works in reality.

Theoretical Framework

CET suggests that external incentives affect intrinsic motivation through two mediating processes: perceived autonomy and perceived competence (Deci et al. 1999). The effect of incentives depends on how they influence the two processes relatively. When individuals are expected to perform a task to certain standards in the presence of external incentives, their perceived autonomy is jeopardized, leading to a more external perceived locus of causality. Such perceived pressure and feel of controlling will undermine people’s intrinsic motivation. Therefore, we observe that completion-contingent monetary incentives, setting a standard of completion to drive people to contribute UGC, thwart individuals’ perceived autonomy, resulting in inferior content quality (e.g., Burtch et al. 2017; Khern-am-nuai et al. 2018; Wang et al. 2016).

However, if the incentives convey certain information about individuals’ capability in the activity area, their perceived competence is strengthened. In this case, the informational aspect of the external
incentive offsets some of its controlling aspect, leading to a crowding-in effect on intrinsic motivation. For example, Cameron et al. (2005) find that achievement-based rewards during learning increased participants’ intrinsic motivation. In their analytical work, Terwiesch and Xu (2008) show that the inefficiency of innovation contest caused by solvers’ underinvestment in effort can be reduced by imposing a performance-contingent award structure.

In our setting, instead of rewarding every user based on the volume of UGC, the platform adopts another approach by only providing monetary compensation to individuals who generate high-quality content. On the one hand, similar to completion-contingent reward, performance-contingent reward may crowd out reviewers’ intrinsic motivation, since the quality standard established by the platform may thwart their perceived autonomy. On the other hand, the marked difference between these two reward structures is that performance-based incentive design also signals that the reward winners are competent for contributing high-quality and reliable information to help others obtain more useful information. Hence, these reviewer’s intrinsic motivation could be enhanced by the informational aspect of performance-based monetary incentives, leading to a better task performance. Therefore, it is an empirical question whether the informational aspect dominates the controlling aspect of performance-based monetary incentives. We develop the following competing hypotheses:

**Hypothesis 1A** Performance-contingent monetary incentives lead to an increase in the review quality.

**Hypothesis 1B** Performance-contingent monetary incentives lead to a decrease in the review quality.

It is natural to expect that performance-based reward may encourage reviewers to generate a larger volume of review. Obtaining more knowledge about the platform’s evaluation criteria and expectations would boost reviewers’ confidence in abilities of generating more content (e.g., Levinthal and March 1993). Additionally, gaining the feeling of recognition would also encourage rewarded reviewers to invest additional effort to contribute more high quality UGC. However, unlike completion-contingent monetary incentives wherein reviewers obtain reward as long as they write, performance-contingent monetary incentives require more intellectual efforts. Hence, the strategy employed to earn completion-contingent rewards, namely, writing as many reviews as possible with minimal effort (e.g., Khern-am-nuai et al. 2018), guarantees no return in the situation of performance-contingent rewards. If total time and efforts dedicated to review generation do not increase dramatically, quality improves at the cost of reduced quantity. Therefore, we motivate hypotheses on review quality as an open empirical question:

**Hypothesis 2A** Performance-contingent monetary incentives lead to an increase in the review quantity.

**Hypothesis 2B** Performance-contingent monetary incentives lead to a decrease in the review quantity.

**Research Context and Data**

**Empirical Setting**

We contextualize our study in one of the most common online communities, review platforms. Specifically, we collaborate with a large restaurant online review platform in Asia that carried out a performance-based monetary incentives program, providing us with a unique opportunity to test the effect of such incentive design. This platform initiated a program called “Review-of-the-Day” in February 2012, wherein monetary incentives were offered to reviewers who contributed the highest quality reviews in each day. Content quality of the reviews is semi-manually evaluated by the platform and the winner is selected based on multiple criteria such as the completeness, readability, credibility, objectiveness, etc. Each winner of the “Review-of-the-Day” is awarded an “exclusive gift,” which varies between two movie tickets, restaurant vouchers, etc. Generally, the value of the gift is about 5 to 10 US dollars. Apart from the gift, the winner does not receive any special recognition (such as a special badge or title) by the platform. In other words, the reward of this program is almost exclusively extrinsic. Currently, the platform provided us with the data including customer reviews (e.g., review id, reviewer id, date, length, rating, the number of photos attached, the number of helpfulness votes, etc.) and reward information (review id, reward date, etc.) over a period from July 2014 to December 2017.
Research Design and Data

The difference between reviews quantity/quality before and after reviewers obtained the reward alone may not be an accurate assessment of the effect of incentives. That is because other factors, such as restaurant promotions, may influence review generation as well. To address these identification issues, we will adopt a natural experimental design. Specifically, we select reviewers who received the reward only once during the period from January 2015 to June 2017 as treated reviewers. For each of them, we perform PSM to select a one-to-one matched control reviewer who was the most similar to the corresponding treated reviewer based on pre-treatment observable characteristics, but never obtained any monetary incentives. The observables adopted for matching are the number of reviews, average word count, and the number of helpfulness votes generated before monetary incentives. We finally obtain 274 reviewers in our sample, with 137 reviewers in each group. Then we construct a panel dataset at reviewer-weekly level. It covers six months before and six months after the reward date. The summary statistics of the data are provided below.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Min</th>
<th>Max</th>
<th>Obs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review count</td>
<td>1.07</td>
<td>3.36</td>
<td>0</td>
<td>72</td>
<td>13,426</td>
</tr>
<tr>
<td>Content length</td>
<td>159.33</td>
<td>363.46</td>
<td>0</td>
<td>7,274</td>
<td>13,426</td>
</tr>
<tr>
<td>Helpfulness vote</td>
<td>1.79</td>
<td>5.40</td>
<td>0</td>
<td>87</td>
<td>13,426</td>
</tr>
</tbody>
</table>

Table 1 Summary Statistics

Empirical Strategy and Preliminary Results

Identification Strategy and Model Specification

We adopt the DID approach based on the multiple linear regression framework to evaluate the effect of performance-based monetary incentives on review quantity and quality. DID estimator is a commonly used technique in a natural experiment research design (e.g., Chan and Ghose 2014; Hosanagar et al. 2013). The estimator measures the effect of exogenous treatment by comparing the average change in the outcome variable over time for the treatment while controlling for the average change over time for the control group. In our context specifically, the difference in review quantity/quality between the treatment and control groups after treated reviewers received the reward that is above the initial difference before the treatment is attributed to the treatment, namely, the effect of performance-contingent monetary incentives. We develop our primary econometric model of this study as follows:

\[ DV_{it} = \beta_0 + \beta_1 Treatment_i \times After_t + \beta_2 R_{it} + \alpha_i + \delta_t + \epsilon_{it} \]

In our model specification, \( DV_{it} \) is the dependent variable (i.e., the number of reviews, the average content length of reviews, and the number of helpfulness vote). \( Treatment_i \) is an indicator variable that takes the value 1 if reviewer \( i \) belongs to the treatment group and 0 if she belongs to the control group. \( After_t \) is an indicator variable that takes the value 1 if the observation is in the post-treatment period and 0 otherwise. In the meantime, the interaction term \( Treatment_i \times After_t \) is the main variable of interest of our study. The coefficient \( \beta_1 \) captures the average treatment effect of the monetary incentives on review quantity and quality. \( R_{it} \) is a vector of control variables. We include a vector of reviewer fixed effects \( \alpha_i \) to account for time-invariant differences across reviewers, and a vector of time fixed effects \( \delta_t \) to control for common shocks over time. \( \epsilon_{it} \) represents the error term. Notably, the variable, \( Treatment_i \), which does not vary over time, and variable, \( After_t \), which does not vary across reviewers, are absorbed in the variables that capture fix effects. Lastly, we will cluster the standard errors at the reviewer level to account for serial correlation in the data (Bertrand et al. 2004).

Preliminary Results

The quantity of content is measured by the number of reviews submitted by a reviewer. In line with previous literature (e.g., Burtch et al. 2017), we adopt the length of reviews and the number of helpfulness votes to measure content quality. Results of the t-test on the differences between the treatment and control group of our variables of interest across time are reported in Table 2. As we hypothesize, both
review length and the number of helpfulness vote increase after the treatment, indicating that performance-contingent monetary incentives enhance UGC quality. The number of reviews also increases in the post treatment period.

<table>
<thead>
<tr>
<th>Difference between the treatment and control group</th>
<th>Before</th>
<th>After</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content length</td>
<td>-8.943</td>
<td>91.972</td>
<td>8.185</td>
<td>0.000</td>
</tr>
<tr>
<td>Helpfulness vote</td>
<td>-0.336</td>
<td>0.551</td>
<td>4.779</td>
<td>0.000</td>
</tr>
<tr>
<td>Review count</td>
<td>-0.005</td>
<td>0.259</td>
<td>2.323</td>
<td>0.020</td>
</tr>
</tbody>
</table>

Table 2. T-test of Differences between the Treatment and Control Group Across Time

Concluding Remarks and Future Directions

Given the discrepancy between the increasing popularity of monetary incentives adoption and its unsatisfying performance of motivating people to generate more useful content, we realize the type of reward structure might be an important moderating condition. In this study, we investigate how performance-contingent monetary incentives alter individuals' content generation behavior in online platforms. Different from widely studied completion-contingent monetary incentives, performance-contingent monetary incentives may potentially enhance content quality through crowding in individuals' intrinsic motivation, as they convey information of individuals' competence in contributing high-quality content. Our preliminary results show initial support to this proposition. This study is currently in progress. We will further conduct our analyses under the proposed framework that utilize PSM and DID.

REFERENCES


