Non-monetary and Monetary Rewards for Product Review Contribution in a Connected Community

-- Evidence From the Lab and the Field

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Joint work with Yacheng Sun and Junlin Du

Introduction

- Integration of online product review and online social networking
  - Consumers are willing to share their reviews through social network
  - Consumers trust the reviews from their online friends more than other strangers
  - Online review publishers build connected online communities
This Study

- Examines in a connected community
  - **Without monetary reward**, the drivers of people offering reviews
  - **With monetary reward**, how people respond

Brief Literature Review

- Non-monetary reward in a connected community
  - Consumers are motivated by favorable perceptions from others
    (Psychology: Fehr and Falk 2002, and Economics: Benabou and Tirole 2006)
  - The motivation for seeking prosocial image is likely to be stronger in a connected community (Andreoni 2007, Chen and Li 2009, Akerlof and Kranton 2000)
  - Toubia and Stephen (2013) find posting on Twitter is driven by enhanced social image

- Monetary reward in a connected community
  - Positive effect of monetary incentive (e.g. Hennig-Thurau et al. 2004, Ryu and Feick 2007, Sun and Zhu 2013)

- Potential conflict between non-monetary and monetary reward
  - “Crowd-out” effect due to concerns of social image (Bénabou and Tirole 2006)

**Prosocial image increases members’ willingness to contribute**

**No empirical studies on the interactions of non-monetary and monetary rewards in a connected community**
Three Predictions

• Based on the literature review:

<table>
<thead>
<tr>
<th>Prediction 1</th>
<th>No monetary reward</th>
<th>Prosocial image <em>increases</em> contribution</th>
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<td>Prediction 2</td>
<td>With monetary reward</td>
<td>Personal gain</td>
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<td>Prediction 3</td>
<td>Charitable gifts</td>
<td>Disclosing the reward is <em>more</em> effective</td>
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Our Studies

• An empirical study and a lab study

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Empirical Study

Data

• Provided by an online social shopping network that operates in Beijing, China.

<table>
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<tr>
<th>Website opened</th>
<th>Data started</th>
<th>The event:</th>
<th>Data ended</th>
</tr>
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• **The event**: introduction of monetary incentive

• Our analysis
  - *Weekly* information for 8 months (about 4 months before, and 4 months after)
  - 878 active customers who signed up *before* the event.
  - Detailed information about their activities (logins, purchases, and product reviews)
  - Their social connections over time
Possible Data Issues

• After the event (introduction of monetary reward), users who like the incentive will more likely to join
  — *Solution*: those users are excluded in this study for the effect of the event

• After the event, members’ social network formations may be different
  — Not an issue in this data: Among all the 878 members, 848 (97%) never added any friends during the period after the introduction of the monetary reward
  — *Solution*: use the “number of friends” of each individual counted right before the event, as a static variable.

• Number of friends could be endogenous to responses to reviews
  — Control for the endogeneity in the hierarchical model
Model Framework

• Hierarchical Bayesian Model
  – Top level:
    • Individual’s decision on product review contributions
    • *Logit Model at individual member level*
  – Lower level:
    • Associate the response parameters from the logit level with the observed characteristics of the members
    • Number of friends enters the lower level model, and control for its endogeneity using exogenous variable.
    • *Multidimensional Normal Regression*

Model Specification (1/3)

• Top level: Logit Model

\[
P(\text{contribute})_{it} = \frac{\exp(U_{it})}{\exp(U_{it}) + 1}
\]

\[
U_{it} = \beta_{0it} + \beta_{1it}I_{it} + \beta_{2it}Tenure_{it} + \epsilon_{it}
\]

– \( \beta_{0it} = \beta_{0i} + \beta_{0t} \) individual-time-specific intercept,
  • \( \beta_{0i} \) individual-specific non-monetary incentive
  • \( \beta_{0t} \) all other time-specific factors
– \( I_{it} = 1 \) if monetary reward is in place; 0 otherwise.
  \( \beta_{1i} \) effect of monetary incentive
– \( Tenure_{it} \) number of weeks \( i \) being a member
  \( \beta_{2i} \) potential fatigue or reinforcing effect
– \( \epsilon_{it} \) individual-week specific random factors, following Logistic distribution
Model Specification (2/3)

• Lower level – Multidimensional Regression

\[ \beta_i = [\beta_{0i}, \beta_{1i}, \beta_{2i}] \]

Explanatory variables: observed characteristics of the members

\[ \beta_i = \alpha_0 + \alpha_1 \ln(F_i) + \alpha_2 \ln(AL_i) + \alpha_3 \ln(AP_i) + \xi_i \]

- \( \alpha_0 \) intercept, with dimension 4x1
- \( F_i \) number of friends counted right before the event
- \( \alpha_1 \) influence of friends on the \( \beta_i \)’s
- \( AL_i \), average number of logins each week by \( i \), before the event
- \( \alpha_2 \) influence from level of engagement on the \( \beta_i \)’s
- \( AP_i \), average number of purchases each week by \( i \), before the event
- \( \alpha_3 \) influence from level of engagement on the \( \beta_i \)’s
- \( \xi_i \), random factors \( \sim N(0, \Sigma_\xi) \). \( \Sigma_\xi \) has dimension 3x3.

Model Specification (3/3)

• Lower level – Endogeneity of the “Friends” variable

\[ \beta_i = [\beta_{0i}, \beta_{1i}, \beta_{2i}] \]

Explanatory variables: observed characteristics of the members

\[ \beta_i = \alpha_0 + \alpha_1 \ln(F_i) + \alpha_2 \ln(AL_i) + \alpha_3 \ln(AP_i) + \xi_i \]

• There may be other causes that lead to the correlation between number of friends and non-monetary incentive.

• Instrument: number of circles

\[ F_i = \theta_0 + \theta_1 NC + \theta_2 \ln(AL_i) + \theta_3 \ln(AP_i) + \eta_i \]

\[ \begin{bmatrix} \xi_i \\ \eta_i \end{bmatrix} \sim N(0, \Sigma) \]
Estimation

- Markov Chain Monte Carlo simulations
  - To obtain individual level estimates $\beta_i$
  - To obtain all the model parameters simultaneously $\beta_i$, $\alpha$ and $\theta$

Estimation Results (1/2)

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<th>Results for the Choice Model $\beta_i$</th>
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<tr>
<td>Intercept ($\beta_{01}$)</td>
<td>-4.603</td>
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<td>(-5.18, -4.05)</td>
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<td>Reward dummy = 1 if monetary reward is provided ($\beta_{11}$)</td>
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<td>(-0.35, 0.73)</td>
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<tr>
<td>Number of weeks being a user on this website/10 ($\beta_{21}$)</td>
<td>0.710</td>
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<td>(0.52, 0.96)</td>
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- Population level estimates for the choice model
  - Baseline contribution (without monetary incentive) is weak
  - The effect of monetary incentive is 0 at the population level
  - “Reinforcing effect”, rather than “fatigue effect”
Estimation Results (2/2)

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<th>Results for the hierarchical model $\delta_{ab}$</th>
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<tr>
<td>Intercept ($\beta_0$)</td>
<td>Intercept $\ln($Friends$)$</td>
</tr>
<tr>
<td>-4.603 (-5.18, -4.05)</td>
<td>-4.848 (-5.30, -4.29)</td>
</tr>
<tr>
<td>Reward dummy = 1 if monetary reward is provided ($\beta_4$)</td>
<td>0.196 (-0.35, 0.73)</td>
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<tr>
<td>Number of weeks being a user on this website/10 ($\beta_2$)</td>
<td>0.710 (0.52, 0.96)</td>
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- Base line contribution level is higher for members with
  - More friends, signed in more often, purchased less often
- Monetary reward influence is higher for members with
  - Fewer friends, higher involvement
- Reinforcing effect is higher for members with
  - More friends, higher involvement

Robustness Checks

- Alternative models:
  - Influence of the social norm
    - Replace the time dummy with the variable “percentage of users who contributed at least one review in week $t$” in the choice model
    - Results: positive and statistically significant
  - Efforts put in reviewing
    - Captured by the number of characters in the review, conditional on the decision of providing review
    - Results:
      - People with more friends tend to write longer reviews
      - People with more friends do not significantly change the length of reviews after monetary incentive was introduced
Lab Study

Scenario Design

- Imagine you and your friend, both Sushi lovers, decided to visit Restaurant X (name omitted), a new Sushi restaurant in town. When you arrived, the restaurant was packed so you waited for about 10 minutes before a table opened up. The restaurant was softly lit, with a warm and inviting atmosphere. Your server was knowledgeable and made good recommendations. After some deliberation, your friend settled for the poached fish. You on the other hand went for the Spicy Tuna Roll, the Rainbow Roll and the Lava Roll. It took about 20 minutes for the food to be served. Your friend’s fish turned out to be delicately cooked, flaky and delicious. Your sushi was presented artfully and was very tasty, …
Study Design

• Between subjects design: 3 conditions
  – 1 (Control, no reward)
  – 2 rewards (cash reward vs. charitable giving)

• Qualtrics subjects
  – 293 subjects, who were U.S. residents, over 18 years of age, and active users of at least one online review community
  – Dependent variable: likelihood of providing review

Willingness to Contribute

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Summary

• In a connected community, using both lab experiment and field study, we find
  – Without monetary reward, positive main effect of prosocial image in encouraging product review offerings
  – With monetary reward, the intrinsic motivations could be crowded out, if it is publicly announced

THANK YOU!