Model Draft

1 Introduction

Firms or individuals planning to develop new products may lack the fund to produce the inaugural batch of products. Therefore, they choose to advertise their ideas or prototypes so that consumers sponsor them in advance. If the fund raised exceeds a pre-specified threshold, the product will be produced and delivered to the consumers. This is the basic idea of 'reward-based crowdfunding'.

Crowdfunding is a typical example of two-sided markets: There is usually a platform where firms publish their projects and consumers decide whether to sponsor them. A greater user base on the platform means more media exposure and higher expected return for project initiators, while a diverse set of projects attracts more consumers. To register as an eligible backer on a platform is usually free. The platform makes profit by charging a commission on the fund raised by each project if it succeeds.

Compared with purchasing items on an ordinary e-commerce platform, crowdfunding is more like a lottery. Although a refund is guaranteed if the project fails, it is probable that the reward of a successful campaign turns out to be of low quality or far from the expectation. Plus, backers cannot obtain feedbacks from previous users as they do on e-commerce platforms.

Consequently, quality management is of great importance for crowdfunding platforms, and is complicated by the cross-side network effect: A stricter screening policy leads to higher average quality, allowing consumers to make purchases with greater confidence. However, the utility gained from product diversity shrinks. Conversely, a more lenient policy attracts more projects, but may causing quality issues. We would expect that in a multi-platform setting, different platforms may adopt distinct screening policies based on their user base and the market environment. Their optimal commission rates may also differ.

To understand the mechanism of quality management, we first study the optimal decision of a project initiator in a multi-platform setting.

2 Framework

Before describing the model, I highlight a few key assumptions of the framework:

(i) There is no same-side network effects. Though there is evidence suggesting the existence of herding behavior among backers, it happens within a single campaign. I also think that the competition between platforms is of second-order importance.

(ii) When deciding whether to become a platform user, consumers only consider the total number of projects on the platform and their average quality.

(iii) The platform where a project is published affects the return of the project only through the amount of users and the commission rate. In reality, consumers on different platforms may have heterogeneous preferences, and platforms vary in their promotional efforts.

Now consider a startup which plans to develop a new product. We assume that a (potential) project is characterized by only one parameter θ indicating its quality. Higher θ means higher success rate and greater profit keeping the other factors unchanged. It can publish the project on a crowdfunding platform and there are two options: Platform A and Platform B. The startup can also choose to publish the project by itself or borrow from the bank to raise funds. We denote the expected profit of the outside option by $f(\theta)$ and f is strictly increasing with θ.

There is continuum of consumers on each platform, denoted by $n^{\mathcal{I}}, \quad \mathcal{I} = A, B$. On project success, the platform will charge a commission rate $\delta^{\mathcal{I}}$ on the fund raised. We assume that the expected profit of project i published on platform $\mathcal{I}$ is

$$u_i^{\mathcal{I}} = (1 - \delta^{\mathcal{I}})(n^{\mathcal{I}}\theta_i + \theta_i^2) \tag{1}$$

According to this expression, the total fund raised by project i consists of two parts: a platform-dependent part $n^{\mathcal{I}}\theta_i$ and a platform-independent part θ_i^2. And the form of platform-independent profit implies that it dominates the platform-dependent part when θ_i is sufficiently large. For example, the merchandise from a popular movie will be sold out no matter where it is published.

2.1 Without Quality Screening

We first analyze a startup's optimal decision without quality screening. First, it will publish the project on the platform if $\max\{u_i^A, u_i^B\} \geq f(\theta)$. Otherwise, it will choose the outside option. The case of interest is when $\min\{u_i^A, u_i^B\} \geq f(\theta)$ and for simplicity we always assume this holds. Subtract u_i^B from u_i^A and we have

$$\begin{aligned} & u_i^A - u_i^B \\ =& \theta_i[(1-\delta^A)n^A - (1-\delta^B)n^B] - (\delta^A - \delta^B)\theta_i^2 \\ =& \theta_i[(1-\delta^A)n^A - (1-\delta^B)n^B - (\delta^A - \delta^B)\theta_i] \end{aligned} \tag{2}$$

We can decompose this difference into two effects, exposure effect and commission effect. The term $(1-\delta^A)n^A - (1-\delta^B)n^B$ is the exposure effect, measuring the difference in the discounted exposure between Platform A and Platform B. The term $(\delta^A - \delta^B)\theta_i$ is the commission effect that captures the difference in 'wasted commission'.

The seller's choice varies with the relative sizes of (δ^A, n^A) and (δ^B, n^B):

(i) $\delta^A \leq \delta^B$, $n^A \geq n^B$

In this case, both the terms are positive, so the seller will choose Platform A.

(ii) $\delta^A > \delta^B$, $n^A \geq n^B$

The exposure effect is positive, but the commission effect is negative.

The seller's choice depends on which effect dominates: If n^A is large enough to sustain Platform A's premium pricing strategy, exposure effect dominates and the seller will choose Platform A. If instead δ^A is exorbitant even after accounting for more users, commission effect dominates and the seller will choose Platform B.

Plus, since the commission effect includes project-specific parameter θ_i, we would expect heterogenous platform responses: Keeping the other factors unchanged, projects with higher θ_i is more likely to be published on Platform B for lower commission rate, while mediocre projects pay a higher commission rate to gain greater visibility.

2.2 With Quality Screening

Now suppose Platform A develops a quality screening mechanism, and only projects with $\theta_i \geq \tilde{\theta}$ are allowed to publish. In reality platforms may adopt different screening mechanisms, such as requiring a business license or requiring the project initiator to run an online store for a certain period of time and meet specific rating criteria. Platforms specializing in certain categories may also review projects based on how well they fit into the category. For simplicity we assume only one platform adopts quality screening, since we only need to limit the scope of projects to those whose quality is above the lower threshold.

(i) $\delta^A \leq \delta^B$, $n^A \geq n^B$

In this case, not all projects are able to publish on Platform A due to the quality threshold, though it is always optimal for them to do so if they are allowed. For projects with $\theta_i \geq \tilde{\theta}$, they will choose Platform A as before. For projects with $\theta_i < \tilde{\theta}$, the startup needs to compare $(1 - \delta^B)(n^B\theta_i + \theta_i^2)$ with the outside option $f(\theta_i)$. Since campaigns of low quality are usually launched by individuals or inexperienced firms, we expect the outside option to be undesirable for this group. Hence Platform B can charge those projects a higher commission rate and earn positive profit. In contrast with the free-entry case, Platform A's screening policy helps its rival in the sense that it entitles Platform B to some market power.

(ii) $\delta^A > \delta^B$, $n^A < n^B$

This case is trivial since Platform A will not be able to attract any project.

(iii) $\delta^A \leq \delta^B$, $n^A < n^B$

If $(1-\delta^A)n^A \geq (1-\delta^B)n^B$, then we are back to case (i).

If instead $(1-\delta^A)n^A < (1-\delta^B)n^B$, that is to say, the discounted exposure on Platform A is less than the one on Platform B. Thee there exists two critical value of θ_i: One is $\theta_i = \tilde{\theta}$, the quality threshold set by Platform A, the other is $\hat{\theta} = \frac{(1-\delta^A)n^A-(1-\delta^B)n^B}{\delta^A-\delta^B} > 0$, a popularity threshold above which crowdfunding projects opt to publish on Platform A for lower commission rate.

Therefore the screening policy in this scenario can be categorized into two types, non-binding screening and binding screening. If $\hat{\theta} \geq \tilde{\theta}$, the threshold $\tilde{\theta}$ is not binding and the responses of project initiators are identical to the free-entry case. Projects popular enough are published on Platform A due to lower commission rate, while thr rest select Platform B to gain exposure. A platform may announce a non-binding threshold to signal to consumers that the projects it hosts are of a superior nature, since without the announcement, it would cost platform users a thorough browsing to find out the overall quality.

If instead $\hat{\theta} < \tilde{\theta}$, then this entry constraint is binding. Projects with $\hat{\theta} \leq \theta_i < \tilde{\theta}$ would join Platform A in absence of quality screening, but are excluded by the screening policy. Similar to case (i), Platform B gains extra market power.

(iv) $\delta^A > \delta^B$, $n^A > n^B$

This is the most complicated case. If $(1-\delta^A)n^A \leq (1-\delta^B)n^B$, then we are back to case (ii). All the projects will publish on Platform B.

If instead $(1-\delta^A)n^A > (1-\delta^B)n^B$, again we have a positive popularity threshold $\hat{\theta}$. If $\tilde{\theta} \geq \hat{\theta}$, then for projects with $\theta_i \geq \hat{\theta}$, they can publish on Platform B. For less competitive firms that require the greater visibility on Platform A, they are not allowed to launch their campaigns on Platform A due to the quality threshold. Consequently, Platform A relinquish its exposure effect and all the projects are published on Platform B. Obviously, this is unlikely to happen in reality.

Is it most intriguing when $\tilde{\theta} < \hat{\theta}$. If so, the response of a project initiator is not monotonic with respect to θ_i. For projects with $\theta_i < \tilde{\theta}$, they demand more exposure but are blocked by the entry barrier, thus opting for Platform B. For projects with $\tilde{\theta} \leq \theta_i < \hat{\theta}$, they pass the qualification test and are in need of more customers, thus selecting Platform A. For influential firms with $\theta_i \geq \hat{\theta}$, they turn to Platform B for less intermediation fee.

3 Discussion

The existence of multiple equilibria and their distinct features have significant implications.

(i) A screening policy is not necessarily binding. Crowdfunding campaigns are self-selected according to the relative exposure effect and commission effect of the two platforms. Hence an entry barrier set by a platform favored by projects of high quality may not be binding. In this case, the announcement of the threshold is a mere signal of the platform's quality to consumers.

(ii) Binding policies may have different implications for the characteristics of market equilibria. In case (i), Platform A's screening policy entitles Platform B to some market power by limiting the available choices of inferior projects. Thus Platform B can earn positive profit instead of zero profit in the free-entry case and can charge a higher commission rate. However, in the non-monotonic separation equilibrium of case (iv), Platform B hosts two distinct types of projects, the influential ones and the inferior ones. Given the platform's limited ability to price discriminate, Platform B may fail to fully internalize the incentives of inferior projects, focusing more on the influential ones. This may lead to a more favorable commission rate. Hence the low-quality projects are able to enjoy more favorable intermediation fee than in case (i). In some sense, they are ‘sheltered’ by the influential campaigns.