Crowdfunding under Word-of-Mouth Communication

**Introduction.** Reward-crowdfunding is the most prolific form of crowdfunding currently taking place in the U.S. The rising popularity of crowdfunding sites such as Kickstarter and Indiegogo has promoted crowdfunding as a modern fund-raising solution. Crowdfunding has gone beyond simply being a tool specifically utilized by small businesses to get a given project off the ground. Even larger firms are now turning to crowdfunding as a way to obtain funds to develop new products, and as a tool to market their products. The All-or-Nothing funding mechanism helps the firm reduce future demand uncertainty and make better procurement, production, and inventory planning based on the advance demand information obtained from crowdfunding results. For new products, the potential market size is usually hard to predict, yet matching supply with demand is important, especially for capital constrained startups. If the campaign goes well, not only does the team have verification that there is a market for their product, they also have capital to fund manufacturing; if it doesn’t, they just spared themselves the pain of spending time and money on a project that may not be met with success. Hence, by crowdfunding the pledge of capital is available to startups before they build their product, which allows them to do important market testing before they spend a dollar of real money.

The benefits of reward-based crowdfunding don’t stop after a project is successfully funded. On the contrary, founders now have a crowd of active early adopters they can count on for feedback, ideas, and help to advocate the product. In fact, crowdfunding has become an important “advertising” tool to help spread the product awareness, in particular through the word-of-mouth (WoM) communication and recommendation. For example, a Nielsen’s report finds that 84% of respondents trust a “recommendations from others”, which is higher than all other forms of advertising\(^1\). Indeed, WoM is the primary factor behind 20% to 50% of all purchasing decisions\(^2\). Its influence is greatest when consumers are buying a product for the first time or when products are relatively expensive, factors that tend to make people conduct more research, seek more opinions, and deliberate longer than they otherwise would.

Motivated by the above practical observations, we develop a two-period model (crowdfunding stage and retail stage) of crowdfunding where a startup strategically chooses the pricing scheme with consideration both the financing role (fund raising) and the marketing role (WoM effect). We ask the following three main research questions in this paper: (i) What is the impact of word-of-mouth communication on the startup’s optimal pricing strategy over two periods? (ii) Whether crowdfunding is a better business model for fund raising, compared to traditional bank financing

---

\(^1\) Source: A Nielsen Report, Global Trust in Advertising and Brand Messages, April 2012

\(^2\) Source: A new way to measure word-of-mouth marketing, McKinsey Quarterly, April 2010
from the perspectives of both funding accessibility and profitability? (iii) What is the impact of funding source (crowdfunding v.s. bank financing) on the consumer surplus and social welfare?

**Literature Review.** There are two primary streams of research related to our work: WoM communication and crowdfunding. WoM communication strategies are appealing because they combine the prospect of overcoming consumer resistance with significantly lower costs and faster delivery—especially through web-based social networking (Trusov et al. 2009). Ajrourlou et al. (2016) study the problem of optimal dynamic pricing for a monopolist selling a product to consumers in a social network (Poisson random network), and show that the optimal dynamic pricing policy drops the price to zero infinitely often. Godes (2016) investigates the equilibrium relationship between product quality and word-of-mouth communication and shows that quality may either increase or decrease as WoM expands. Our study also falls into the rising research stream on crowdfunding. Hu et al. (2015) study how the crowdfunding mechanism affects a firm’s product and pricing decisions in a two-period game. Chakraborty and Swinney (2017) explore how the entrepreneur can signal quality to contributors via the design of the crowdfunding campaign. Focusing on the moral hazard problem, Strausz (2017) argues that the optimal crowdfunding mechanism should implement deferred payments to project creators. Alaei et al. (2016) provide a dynamic model of crowdfunding and Du et al. (2017) propose several contingent stimulus policies to mitigate the “cascade effect” on backers’ pledging. Babich et al. (2017) show that crowdfunding alters interactions between the entrepreneur and the traditional financing sources, and may either benefit or hurt entrepreneurs. Our study provides a new model of crowdfunding that integrates the operations, marketing and finance aspects of the rewards-based crowdfunding, and focuses on the role of word-of-mouth communication in shaping optimal crowdfunding pricing strategies, as well as comprehensive comparisons to traditional bank financing.

**Main Results.** In this paper, we study a model of crowdfunding where the startup strategically chooses the pricing scheme, over two stages (crowdfunding and retail) of selling horizon to maximize total profit. A larger number of early adopters in the crowdfunding stage helps increase the product awareness in the retail stage through WoM communication. The main challenge is to optimize the two prices (crowdfunding price and retail price), by balancing the immediate revenue loss from offering crowdfunding rewards to encourage the product information diffusion through word-of-mouth, and the future profit gain from selling the product to sizeable parts of the consumer population that would remain otherwise uninformed. Under this modeling framework, we first characterize the optimal pricing policy under different investment feasibility. Depending on the word-of-mouth intensity, the optimal strategy could be uniform pricing, intertemporal pricing, or free-sample seeding. Without the WoM effect, it is always optimal to adopt uniform pricing; as the WoM effect increases, the optimal profit always increases, while the optimal crowdfunding price first
decreases, then increases. Next, we find the credit rating and the inherent market risk determine
the startup’s accessibility to bank financing, but the optimal pricing is independent of them.
Compared to crowdfunding, bank financing outperforms when the market uncertainty is medium,
whereas crowdfunding yields higher profit in the region of either low or high uncertainty. Lastly,
we show that in comparison to bank financing, crowdfunding always increases consumer surplus
and social welfare under high investment feasibility, but may increase or decrease them under
medium investment feasibility. Interestingly, consumer surplus and social welfare may decrease as
the word-of-mouth intensity increases in the medium range, contrary to the conventional wisdom
that word-of-mouth should help consumers.

The key contribution of this paper is that we link directly and, to our knowledge, for the first
time, the firm’s operational decisions (pricing scheme) in crowdfunding to the level of both invest-
ment feasibility (financing role) and WoM intensity (marketing role) in the marketplace. The most
significant managerial implication of our results is the comprehensive comparisons (startup profit,
consumer surplus and social welfare) between crowdfunding and bank financing under different
scenarios along two key dimensions: market uncertainty and WoM intensity. These insights provide
useful guidance on how startups can jointly exploit the financing and marketing benefits of crowd-
funding, as well as clear justification on when crowdfunding is a win-win alternative fund-raising
solution to support entrepreneurship and innovation.

References
effect. Management Science .
Babich, Volodymyr, Gerry Tsoukalas, Simone Marinesi. 2017. Does crowdfunding benefit entrepreneurs and
Chakraborty, Soudipta, Robert Swinney. 2017. Signaling to the crowd: Private quality information and
Hu, Ming, Xi Li, Mengze Shi. 2015. Product and pricing decisions in crowdfunding. Marketing Science 34(3)
331–345.
Strausz, Roland. 2017. A theory of crowdfunding: A mechanism design approach with demand uncertainty
Trusov, Michael, Randolph E Bucklin, Koen Pauwels. 2009. Effects of word-of-mouth versus traditional