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Socialize More, Pay Less: Randomized Field Experiments on Social Pricing

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Abstract. A growing number of online retailers have started to mesh their pricing strategies with consumers' social networks. Specifically, they allow consumers to invite peers from social media to request a discount for their purchases. Inspired by this phenomenon, we propose *social pricing*, a novel pricing framework under which consumers with higher social capital enjoy a better price. Conceptually, social pricing enables firms to achieve price discrimination based on a consumer's social value. This is in sharp contrast with traditional price discrimination strategies where price differentiation typically hinges on consumers' personal value (individual willingness to pay). Although social pricing has been popular in practice, whether it works, why it works, and how it works remain unclear because of a lack of rigorous academic research. To address this gap, we design and conduct two randomized field experiments on a leading online fresh food retailer to understand the value of social pricing. Social pricing has been commonly credited for its effectiveness in new customer acquisition. Interestingly, our study reveals that it is also highly effective on existing consumers. Our analysis shows that social pricing can increase an online retailer's profit by 40% solely from existing consumers, compared with regular firm-offered discounts. Exploration of the underlying mechanisms reveals that *perceived engagement* and *social cost* are the main drivers here, which not only help to increase purchasing frequency but also induce higher order value per purchase. In a follow-up experiment, we vary the rules of social interactions by requiring heterogeneity in consumers' purchasing frequencies. The results suggest that a heterogeneity-based strategy can further amplify the benefits of social pricing. In summary, our study conceptualizes a novel pricing scheme, social pricing, and provides valuable guidance to both researchers and practitioners by offering actionable insights regarding the design of social pricing strategies.

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Your network is the people who want to help you, and you want to help them, and that's really powerful.—Reid Hoffman, cofounder and executive chairman of LinkedIn. (Carboni 2018, p. 112)

1. Introduction

In the past decade, social networking through social media has become an essential and integral component of daily life. Leading social networking platform *Facebook* has 2.7 billion monthly active users; free instant messaging app *WhatsApp* has a user base of two

billion, and multipurpose social network app *WeChat* has reached 1.24 billion monthly active users in 2021 (Statista 2021). Social networking has fundamentally changed the way people all over the world interact and communicate. Because of this explosive growth and huge influence, businesses have spent billions of dollars on social networking platforms to market and promote their products through digital advertisements (Kumar et al. 2020, Mallipeddi et al. 2021b).

There is an emerging trend that online retailers incorporate consumers' social networks into their pricing strategy. Specifically, online retailers allow

consumers to leverage their social networks to get better prices (larger discounts). For example, the leading e-commerce platform *Pinduoduo* (NASDAQ: PDD) in China provides discounts to consumers during the checkout stage if they can invite friends from social networking platforms to “bargain” for their purchase (Graziani 2018). Note that the invitees only need to click the bargain button (rather than purchasing the product, as in group buying) to activate the discount for the inviters. Businesses leverage consumers’ social capital in their pricing strategy, and consumers can get better prices if they have higher social capital. We propose this novel pricing framework as *social pricing*. Despite the popularity of social pricing in practice, academic research into this novel pricing framework is in a nascent stage, and the effectiveness and mechanisms of social pricing strategies have not been analyzed empirically. In this research, we strive to address this critical issue.

1.1. Motivation

Social pricing is a novel and emerging pricing framework. In a popular implementation of social pricing, consumers can ask their friends to request discounts for their purchase. Specifically, when focal consumers place an order, they have the option to invite friends from social media (“social bargainers” in the remainder of the paper) to bargain for their purchase. For each social bargainer who agrees to help, the focal consumer can get a certain percentage fixed discount toward his or her purchase (“social discounts” in the remainder of the paper). Note that the entire process must be completed within a prespecified time frame. Because of the time-sensitive nature of social pricing, it is generally implemented through mobile apps, although the focal consumers can send links through desktops or tablets as well.

The emergence and prevalence of social pricing is largely a result of rapid development of social media and mobile technology. From a conceptual perspective, social pricing enables firms to achieve price discrimination based on consumers’ social value: Consumers who have higher *social* value get better prices. This pricing framework is in sharp contrast to traditional price discrimination, in which the price differentiation relies on consumers’ *individual* willingness to pay. To the best of our knowledge, this is the first study to investigate the integration of consumers’ social value into firms’ pricing strategies.

Social pricing has been adopted across many different industries with a large mobile presence. In the e-commerce domain, the online marketplaces *Banggood*, *Lazada*, and *Club Factory*¹ have all introduced a social pricing option called “slash the price” on their websites, which allows consumers to get a better deal by inviting more friends from social networking

platforms to help. Online travel agency *Trip.com* provides a coupon to focal consumers if they can invite five friends to help within 48 hours. Similarly, *Airbnb China* gives users a 10% off coupon if they can invite a sufficient number of friends to support.² In the online gaming space, the popular game *PlayerUnknown’s Battlegrounds* (PUBG) encourages players to send requests to their friends to bargain for their game equipment purchases. The more friends a player can invite, the lower the prices will become (Raj 2018).

Marketers’ insight has attributed the popularity of social pricing to its effectiveness in acquiring new customers (Kumar and Qiu 2021, Lee 2018). Clearly, social pricing can help to attract new customers who had not previously been aware of the business, as some of the social bargainers may register and become customers themselves. It is straightforward to see the benefits of social pricing in terms of *new* customer acquisition, but it is not obvious whether social pricing has an impact on *existing* customers. Whether it works, why it works, and how it works remain unclear because of the lack of rigorous academic research. The answers to these questions are not only academically stimulating but also practically relevant to businesses.

However, the above questions cannot be answered by analyzing a collection of secondary data because it is impossible to isolate the benefits of retaining existing customers from those of acquiring new customers. To address this issue, we design and conduct two randomized field experiments on social pricing, in the context of an online retailer of fresh food, to focus on the firm’s benefits from social pricing on existing customers. Our experimental design allows us to cleanly identify the effectiveness of social pricing in promoting purchases by existing customers. Further, our research also provides practical guidance on how to better design social pricing strategies.

1.2. Research Questions

The key focus of our study is to understand the new phenomenon of social pricing. Against the backdrop of prevalence in practice, it is imperative for academic researchers to provide causal evidence for the effectiveness of social pricing. However, the relevant research is scant. To address this crucial research gap, we leverage randomized field experiments on a leading fresh food online retailer to estimate the true economic value of social pricing. Next, we highlight the key questions addressed in this study.

First, because social pricing combines utilizing social interactions (more active consumers) and providing discounts (lower margins), it is natural for the online retailer to ask the following: *Does social pricing increase a retailer’s profit? More importantly, can social pricing generate more profit than conventional retailer-initiated discounts?* It may seem intuitive that price

discounts obtained from social pricing will increase sales; however, it is not clear whether the loss in margin due to a discount can be recouped by the additional sales promoted by the discount. Thus, we first compare social pricing strategy with regular full pricing. Additionally, retailer-initiated price discount has been a popular pricing strategy because it is a commonly used instrument for the retailer to adjust prices. To determine whether incorporating the social aspect makes social pricing more effective, we further compare social pricing with a retailer-initiated discount strategy.

Bearing those two questions in mind, we construct two control conditions in Experiment 1. In the first control condition, consumers are charged with regular prices. In the second control condition, consumers are directly offered firm discounts that are comparable to the average social discounts in the treatment group. Our results show consistent evidence that social pricing is more effective than both nondiscount regular pricing and retailer-initiated fixed discount (in terms of both sales and profits), which provides solid evidence to convince managers of the benefits of social pricing.

Second, an exploration of the underlying mechanisms is crucial because it can guide firms on how to stimulate the right social dimensions. This leads to the following research question: *What are the major mechanisms for consumers engaged in social pricing to increase purchases?* Without a rigorously designed experiment, it is very difficult to identify the major mechanisms among competing ones: Consumers who are exposed to social pricing may increase purchases for many reasons, including conformality, novelty, and gift effect. Experiment 1 reveals that perceived engagement and social cost are the main drivers here. Specifically, perceived engagement explains why social pricing can increase purchasing frequency, whereas social cost explains why social pricing can lift order value. The managerial implication to retailers is pivotal. In order to successfully launch a social pricing campaign, retailers need to target consumers who have high levels of engagement and social cost.

Third, we also attempt to help retailers understand how to enhance the effectiveness of social pricing by asking the following question: *Can social pricing increase a retailer's profit even further by varying the rules of consumer social interactions?* Experiment 1 captures homogeneity in purchasing frequency (Zhang et al. 2018): consumers with similar purchasing frequency cluster and request discounts for each other. To the best of our knowledge, there are no extant studies about heterogeneity-based marketing efforts. Hence, in Experiment 2, we vary the structure of consumer social interactions in social pricing. Specifically, we test the effectiveness of the heterogeneity rule of social pricing in the setting of repeat purchases: We require consumers to select social bargainers with higher

purchasing frequency (one standard deviation above). Interestingly, we find that social pricing based on the heterogeneity rule is more effective in stimulating both purchasing frequency and order value per purchase. This finding is not only an important supplement to the academic literature but is also highly relevant to retailers who strive to design more compelling social pricing campaigns. Retailers can refine the social pricing design and better promote repeat purchases by enhancing social interactions between consumers who are heterogeneous in status.

To the best of our knowledge, this study is the first attempt to explore pricing strategies based on consumers' social value. Relevant research is scant, probably because estimating the causal effects of social pricing poses several identification challenges, such as endogeneity, sample selection, reverse causality, and correlated unobservables (Hartmann et al. 2008, Qiu and Kumar 2017). To address this crucial research gap, our study first conceptualizes social pricing as a new pricing framework, then circumvents many empirical challenges through well-designed randomized field experiments and further provides managerial insights to practitioners by offering actionable strategies regarding the design of social pricing. Our research also contributes to the emerging applications of social commerce by documenting how to design consumer social interactions toward improved e-commerce performance.

2. Theoretical Background and Research Framework

Our study has points of contact with the literature on (i) price discrimination on consumer value, (ii) social network marketing and pricing, and (iii) mechanism design in social commerce; but it also deviates from the existing literature in some essential aspects. Extant research not only helps the positioning of this study but also motivates the corresponding research questions discussed earlier. The answers to these questions make important contributions to the relevant literature.

2.1. Price Discrimination on Consumer Value

Our research is built on the broad literature of price discrimination. Traditionally, price differentiation is based on consumers' personal value, that is, consumers with higher personal value to sellers are offered better prices (e.g., Zhao et al. 2015, Wang et al. 2016). Notable examples include personalized promotions (Shaffer and Zhang 2002), one-to-one marketing (Panbras and Sudhir 2007), targeted pricing (Besanko et al. 2003), contingent pricing (Biyalogorsky and Gerstner 2004), and advance purchase (Dana 1998). Joo et al. (2011) suggest that consumers' willingness to pay is an important part of personal value to the firm and

that consumers' value should also incorporate social network properties.

Our paper documents a new area of study: price discrimination based on consumers' social value. By incorporating social value into pricing decisions, retailers have the opportunity to profit from another segment of consumers who have low personal willingness to pay but high social value. Consumers who pursue social pricing reveal their low personal willingness to pay by requesting a discount, which will be approved only if they can show rich social resources, that is, existing or prospective consumers of the firm.

2.2. Social Network Marketing and Pricing

Social pricing is related to marketing and pricing strategies that involve consumer social interactions, such as social coupons, sharable coupons, and group buying. It also deviates from existing literature significantly. Social coupons, also known as daily deals or social deals, use price discounts to increase awareness or encourage observational learning among general online population (Kumar and Rajan 2012, Luo et al. 2014, Subramanian and Rao 2016) without social pricing's design to target buyers. Shareable coupons can target at consumers who are willing to share coupons voluntarily within their social networks (Iyengar and Park 2016), but the discount cannot be accumulated by sharing with more peers as in social pricing. In group buying, better informed consumers voluntarily act as sales agents to persuade less informed consumers to make the same purchase (Jing and Xie 2011); but both better informed consumers and less informed consumers need to make the same purchase at the same price without any differentiation.

In contrast to the abovementioned pricing strategies, social pricing framework is unique in the following ways: (1) Firms can control the rules of social pricing in order to target different buyers and bargainers. (2) Different buyers receive different prices based on the number of bargainers they can invite, that is, social pricing utilizes a buyer's social network value in comparison with the personal value used by traditional price discrimination strategies. (3) Bargainers do not need to make a purchase in order to generate a discount for the buyers, which also deviates from the other pricing strategies in the extant literature. In this research, we will investigate the underlying mechanisms to explain the uniqueness of social pricing.

2.3. Mechanism Design in Social Commerce

Our research contributes to the emerging literature on mechanism design in social commerce. Shen and Eder (2011, p. 19) propose that social commerce offers "Technology-enabled shopping experiences where online consumer interactions provide the main mechanism for conducting social shopping activities." Thus,

social commerce can be regarded as a combination of shopping and social networking activities in online settings (Wang and Zhang 2012). In social commerce, an important task is to design mechanisms of consumer social interactions toward a desired business goal (Busalim and Hussin 2016). However, relevant research is scant.

One relevant stream explores how social networks interact with consumer behaviors in determining firm performance. For example, Huang et al. (2017) and Kumar et al. (2018a, 2018b, 2019) investigate the interaction between social network sites and user-generated content for online reviews. Qiu et al. (2018) examine the interaction between social factors and observational learning. However, these studies focus on the behaviors on the consumers' side, not the strategic variables that can be initiated and manipulated by firms.

In our research, the retailer creates social interactions by determining rules of social pricing in retailer-specified consumer communities. The retailer can initiate and manipulate social interactions while reaping the benefits of social interactions. In Experiment 1, the retailer-made rule of social pricing guides social interactions toward homogeneity in purchasing frequency (i.e., consumers with similar purchasing frequency request discounts for each other). Inspired by this insight, we explore how retailers can design better rules of social interactions to further increase profit. We explore whether the heterogeneity rule, under certain conditions, can lead to even greater profits. Correspondingly, in Experiment 2, we require that focal consumers and social bargainers should differ in purchasing frequency. We capture convincing evidence advocating heterogeneity-based social pricing.

3. Research Context

In this study, we have collaborated closely with a large online grocery retailer in Asia.³ This online retailer sells high-quality fresh food primarily in three categories: vegetables, fruits, and meats. It attracted over 600,000 monthly active users during the data collection period (September 2018–August 2019). This online retailer has a user interface with *WeChat*, the most popular social networking app in Asia with over one billion monthly active users. As a result, we have access to complete records of consumer social interactions related to social pricing. Our corporate partner is keen on estimating the unbiased effects of social pricing relative to conventional nonsocial pricing strategies. We conducted two field experiments to study the value of social pricing. To ensure that there were no contamination effects, the platform deliberately refrained from sending other marketing promotions during the experiment periods. To help readers to get familiar with our research setting, we provide several screenshots in Online Appendix A.

Fresh food is an ideal product category to estimate the effectiveness of social pricing for several reasons. First, consumers have high purchasing frequency, which ensures that consumers are aware of the benefits and costs of social pricing quickly. Accordingly, a short experiment period (i.e., one month) is sufficient to observe the effects of social pricing. A short experiment window also helps to reduce the possibility of other confounding effects. To ensure the robustness of our findings, we also extend the experiment period to three months and find similar results. Second, consumers of fresh food pursue both quality and prices. Consumers who seek social pricing in this category are not limited to price-sensitive people (Gao et al. 2020). Third, consumers of fresh food are very diverse in terms of demographic characteristics (e.g., gender, age, education, occupation, and income). All these merits ensure that our research setting contributes to both validity and generalization of the potential findings of social pricing.

3.1. Social Bargaining

Our empirical study chooses *social bargaining* as the specific implementation under the “higher social capital = better price” social pricing framework. In social bargaining, the idea of “social capital” is realized through the number of friends who are willing to click a “help bargain” link sent by the focal buyer. Tokman et al. (2007, p. 39) define social capital as “an advantage that is built in social relationships, which over time accumulates in the form of a series of relationship-specific obligations and reciprocity expectations.” Adler and Kwon (2002, p. 25) claim that “Social capital is sometimes motivated by normative commitments of a less directly instrumental

nature, such as norms of generalized reciprocity.” Nahapiet and Ghoshal (1998) conclude that social capital encourages cooperative behavior. Thus, social capital may contribute to the reciprocity relationship in social bargaining that involves a focal buyer and the social bargainer. Social bargaining was first adopted by *Pinduoduo*, a leading Chinese e-commerce platform. This online retailer has experienced a rapid growth largely due to its success in commercializing consumer social interactions. Inspired by its success, different forms of social pricing have been adopted by leading platforms across many categories.

The details of social bargaining in our research setting can be described as follows. As illustrated in Figure 1(a), when a buyer places an order, he or she has the option to activate social bargaining by clicking a button labeled “*invite friends to bargain*” and the buyer is automatically led to the interface of *WeChat* to select and notify friend(s) to bargain for his or her purchase. A potential bargainer, upon receipt of the bargaining invitation, is notified about the focal buyer’s purchase in the invitation link. The bargainer who agrees to help will click the “*bargain for my friend*” link in the *WeChat* message. Each bargainer can contribute a social discount (e.g., 3% off the original price) toward a larger accumulated discount for the buyer. Each social bargaining order must be completed within one hour or the link expires. Figure 1(b) shows the price after subtracting the social discount (3% of the regular price). Bargainers can observe the total bill as well as what the focal users buy (including each item and the price) in the invitation page. Purchasers can also observe the identity of each bargainer and their bargaining discounts.

Figure 1. (Color online) Screenshots (with Translation) of Shopping Cart When Social Bargaining is Available



3.2. Experimental Setting

We conduct two randomized field experiments to estimate the causal effects of social bargaining. In Experiment 1, we allow consumers to ask anyone in the treatment group to bargain for their purchase and find that consumers engaged in social bargaining for each other show homogeneity in their purchasing frequencies. In Experiment 2, we allow only heterogeneity-based social interactions. Although other settings remain identical, focal buyers can invite only bargainers with higher purchasing frequency by at least one standard deviation (SD) (Park and John 2010, Tucker and Zhang 2011). In both experiments, as illustrated in Figure 2, there are three experimental conditions: one treatment condition and two control conditions. All experimental conditions last for one month. The functionality of social bargaining only exists in the treatment condition and not in the control conditions. Accordingly, the activities of inviting social bargaining (by focal buyers) or accepting invitations of social bargaining (by bargainers) are only allowed in the treatment condition.

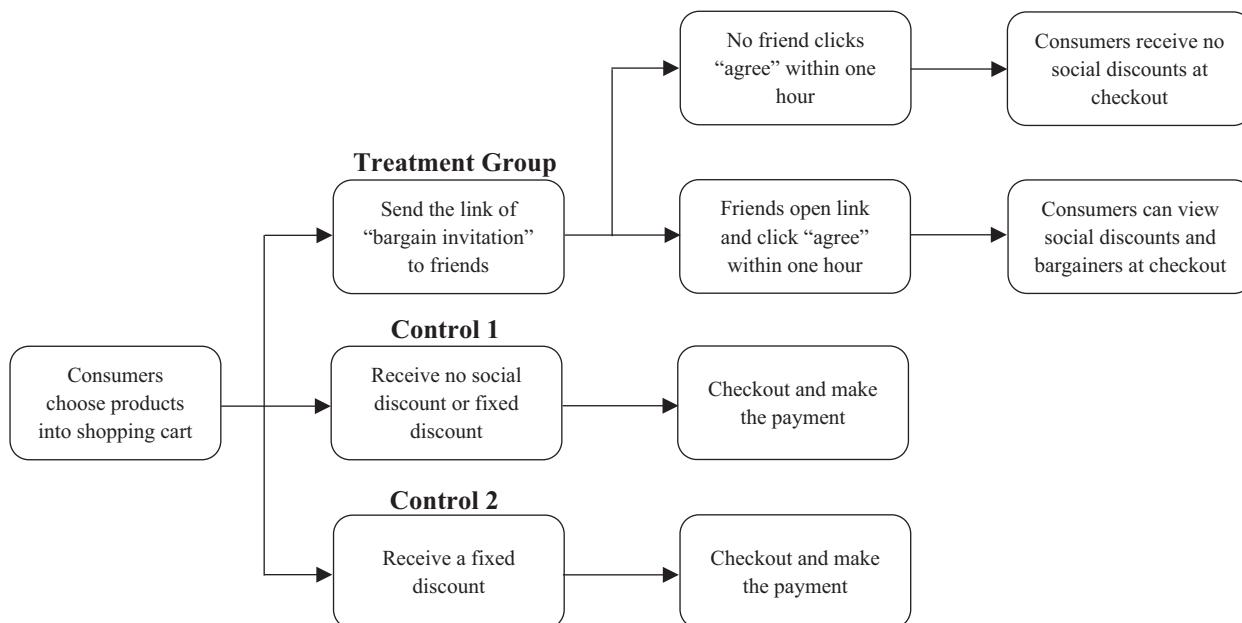
Two control conditions correspond most naturally to the treatment condition. In the first control condition, users are charged with regular prices without the option of social bargaining. In the second control condition, we set up five groups with different fixed discounts (i.e., 5%, 10%, 15%, 20%, and 25%) because we could not know the average depth of social discounts in the treatment group before the experiment. By comparing with different levels of fixed discounts, we aim to exclude the competing explanation that the

potential effects of social bargaining are caused by price discounts instead of social influence.⁴

Then, the retailer randomly assigns 200 existing consumers into each of the seven experimental groups (i.e., one treatment group, one no-discount group, and five fixed-discount groups).⁵ In our randomization process, we do not allow consumers to choose whether being “treated” or not to avoid self-selection bias. The only difference between the treatment and control groups is the availability of the social bargaining function. We conduct randomization checks of participants’ characteristics including demographics and historical purchasing behaviors to ensure that participants are similar across critical observables, as shown in Online Appendix B. The randomized experiment ensures that the differences between the treatment and control conditions in the retailer’s performance (sales and profits) as well as the consumers’ purchasing behaviors (purchasing frequency and order value per purchase) are the causal effects of social bargaining.

To ensure homogeneity in social value between the treatment and control groups before the experiment, we adopt firm-sponsored consumer communities rather than independently formed social networks; that is, the firm specifies existing consumers for each experimental community (Porter and Donthu 2008). This design ensures that we are able to quantify the value of social pricing from existing customers by removing the effect of new customer acquisition. In our experimental settings, the retailer randomly assigned members to the treatment and control conditions. Thus, we can ensure minimum existing social

Figure 2. Experimental Design of the Current Study



relationships within the communities before the experiment, and the random assignment of consumers ensures that the established social relationships are homogenous between treatment and control conditions.

When 200 consumers are randomly assigned to form the treatment community, they need to become *WeChat* friends before they can send or accept bargaining invitations. The retailer also sets up algorithms to ensure that only the 200 consumers within the community can generate valid social discounts for each other. A focal buyer can choose how many friends to add within that community, not necessarily all 199 other consumers. When requesting social discounts, they can only invite bargainers within the community rather than bring their existing social networks into the community. To avoid excessive bargaining requests or harassment, (1) the maximum total discount is set to 30% per order and (2) the social bargaining link will expire within one hour. Each randomly selected consumer in one group is not included in another group in order to avoid contamination, as the same subject would not be exposed to more than one intervention. In this way, we build closed-loop social interactions within the community and eliminate potential unobserved heterogeneity in participants' social value between different experimental conditions. In the randomization check in Online Appendix B, we show that different experimental groups are comparable in social activity level, a self-reported measure, as the proxy of consumers' social value.

Although prior studies (e.g., Centola 2010, 2011) manipulate consumers' own social networks to examine the effect of network structure on adoption, this design is neither relevant nor feasible in our study. We do not allow users to ask friends from their own social networks because of the internal validity requirement of our experiments. Including personal networks will introduce uncontrollable self-selection bias and endogeneity issues, making the experiment groups not comparable. First and foremost, allowing consumers to use their own social networks will inevitably introduce new customers. This contaminates the value of social pricing on existing consumers, which is the key focus of our study. Second, social influence of each participant in his or her own social network is unobserved before the experiment. In particular, diffusion of peer influence within a social network is determined by several structure-related characteristics of the social network including centrality and betweenness (Katona et al. 2011), clustering versus separation (Centola 2010), and opinion leadership (Iyengar et al. 2011a, Mallipeddi et al. 2021a), which can hardly be observed prior to the experiment. Third, a consumer's social network is not fixed, as new friends may join and existing friends may leave, making it hard to predict whether a social network will expand or

shrink during the experiment. Next, to rigorously control the social capital of participants, we need to consider social networks in a hierarchy (i.e., not only friends of a consumer but also friends of friends), which essentially increases the chance of overlapping between the treatment and control groups and may potentially bias the results. In sum, by using firm-specified consumer communities, we can focus on the key research issues and circumvent many identification problems by manipulating consumer social networks directly, while still maintaining external validity of our field experiments.

4. Experiment 1

We conduct a randomized field experiment designed specifically to estimate the causal effects of social bargaining. Our experiment manipulates the use (the treatment condition) or nonuse (the control conditions) of social bargaining. Then, we compare performance of the retailer and purchasing behaviors of consumers between the treatment and control conditions to quantify the causal effects of social bargaining.

Before introducing the details of experimental design, we will first explain why we choose the two moderators in the experiment that influence purchasing behaviors (purchasing frequency and order value per purchase). First, we argue that for social bargainers, the activity of bargaining for others greatly enhances the sense of engagement in the purchases made by focal buyers, which increases their own purchase intention. Manchanda et al. (2015) propose the social dollar effect of joining a consumer community, that is, "customers who join the community become more engaged with the firm and/or its products, and as a result, increase their economic activity with the firm." Specifically, Manchanda et al. (2015) argue that the simple contagion by merely observing others' purchases in a consumer community can increase the frequency of their own purchases. In our empirical setting, the interactions of social bargainers with focal buyers are beyond simple contagion. A social bargainer is fully engaged in the purchase of the focal buyer by voluntarily requesting a social discount toward that purchase. We expect that the social dollar effect becomes stronger if the level of social contagion increases from simple observation to full engagement. Overall, the positive effect of social bargaining on purchasing frequency can be explained by the social dollar theory. Thus, we use perceived engagement as one moderator in the experimental design.

Second, we argue that consumers in the social bargaining community increase order value for the sake of social cost. According to Ashworth et al. (2005), a deliberate and socially observable attempt to save money will generate the social stigma of being

perceived as cheap or stingy, which is a social cost to the affected consumers. In our research setting, consumers who publicly activate social bargaining to save money bring social cost to themselves. Moreover, social stigma of the primary recipient can spill over to other people including strangers by association, and social stigma by association is higher if the relationship between the primary recipient and the related others is stronger (Argo and Main 2008). In our context, bargainers are subject to strong social stigma by association because they actively request social discounts for focal consumers (although not for their own use). To reduce social cost brought by social stigma, consumers who initiate social bargaining can increase order value, which results in higher savings (in absolute amount) from a social discount of fixed depth. As suggested by Ashworth et al. (2005), a strong economic incentive can justify a focal consumer's pursuit of savings and consequently reduce social cost. The savings from increased order value can also justify the effort of social bargainers, thus reducing their social stigma by association. Interestingly, initiating social interactions (by requesting social bargaining in our study) leverages the focal consumers' susceptibility to peer influence, which causes self-enhancement of their own purchases. This susceptibility due to social cost indicates consumers' considerations of social norms (Iyengar et al. 2011b). In sum, the social stigma theory can explain why social bargaining stimulates order value. Thus, we use social cost as another moderator in the experimental design.

4.1. Experimental Design

Consumers are randomly assigned to treatment or control conditions. Random assignment ensures that the treatment and control groups differ only in the adoption of social bargaining. By comparing the retailer's performance and consumers' purchasing behaviors between different experimental conditions, we capture causal estimates of the effects of social bargaining.

In the treatment condition, consumers are offered the option of social bargaining. When placing an order, consumers can activate the social bargaining option by inviting peers from the same community (i.e., social bargainers) to request a price discount (i.e., a

social discount) for their purchase. Each social discount is a percentage of reduction off the regular price. The social discount ranges from 1%–5% (per bargainer) and is randomly determined by the experiment. The maximum discount that a consumer can get through social bargaining is capped at 30% per order. Our experiment enables participants know each other's purchasing behaviors before and during the experiment. The platform reports each consumer's previous purchasing behaviors (including purchasing frequency and average order value per purchase) and makes them easily accessible, so that all consumers are able to observe the purchasing behaviors of others.

4.2. Main Results

We observe that 96% of consumers in the treatment group activate social bargaining every time, indicating social pricing is appealing to a comprehensive sample of consumers. Table 1 reports summary statistics and correlation coefficients of purchasing behaviors in the treatment group. An average consumer in the treatment group has 4.23 social bargainers for each purchase, enjoying a social discount of 12.58%. The consumer purchases at a frequency of 0.45 times per day on average, each time ordering 56.83 renminbi (RMB) worth of fresh food on average. In particular, the average depth of social discounts is closely related to the number of social bargainers. This result supports the defining characteristic of social pricing: Consumers with a higher social capital are charged a better price. Thus, social bargaining achieves the goal of price discrimination based on consumers' social value.

Further, we explore the determinant of consumers' activation of social bargaining. We propose price sensitivity as the critical factor that determines whether a consumer activates social bargaining or not. We use income as the proxy of price sensitivity. High-income consumers tend to be less price sensitive. We use residence address (delivery address of fresh food) to identify this proxy of consumer income. For example, living in a high-end apartment implies a resident's high income, regardless of whether the resident owns or rents the apartment. The observational data show that residence price is significantly higher for the remaining 4% of consumers (87,500 versus 59,800

Table 1. Purchasing Behaviors in the Treatment Group (Experiment 1)

	Summary statistics		Correlations			
	Mean	Standard deviation	1	2	3	4
1. Average social discount (%)	12.58	9.19	1.00			
2. Number of social bargainers	4.23	6.38	0.95**	1.00		
3. Purchasing frequency	0.45	0.27	0.83**	0.79**	1.00	
4. Order value	56.83	36.15	0.48**	0.39**	0.17	1.00

** $p < 0.05$; * $p < 0.10$.

RMB/square meter; $p < 0.05$). Thus, consumers who have low price sensitivity may not be attracted by social bargaining. It is worthwhile to note that our randomization check indicates that different experimental conditions are comparable in this proxy of price sensitivity.

4.2.1. Comparison with Nonsocial Pricing. To fully evaluate social pricing, we compare retailer performance and consumer purchasing behaviors between social pricing and conventional nonsocial pricing strategies. The retailer performance data includes sales and profit, which are aggregated over the experimental groups, not at the level of individual consumers.⁶ Therefore, we report percentage change of sales and profit at the group level. For purchasing behaviors, the unit of analyses is at the individual consumer level over the month of the experiment. These cross-sectional data aggregate all purchases of each consumer within one month. Table 2 reports before- and after-treatment differences in retailer performance and purchasing behaviors between the treatment and control groups.⁷ Because there are no significant differences before the treatment, we report after-treatment differences as the treatment effects.

Impressively, compared with regular pricing, social bargaining can lift sales by 82.12% and at the same time improve profits by 28.73%. This positive effect on profit is particularly encouraging, indicating that the retailer's gain from social bargaining (by stimulating more purchases) is sufficient to recoup the loss in margin (due to social discounts). These results suggest that in the era of social networking, retailers should take consumer social interactions into consideration when designing their pricing strategy.

Following Manchanda et al. (2015) who focus on purchasing frequency and order value per purchase when examining the influence of social interactions within consumer communities, our results show that social bargaining can stimulate the same two purchasing behaviors. Compared with regular pricing, social pricing increases purchasing frequency by 50.0% and order value by 21.4%. These results add significantly to extant findings that social interactions among consumer communities increase order frequency (Manchanda et al. 2015) but cannot increase order value (Schau et al. 2009, Manchanda et al. 2015).

Next, we compare social bargaining with firm-initiated discounts. Because the average depth of social discounts is 12.58%, our comparison focuses on the two control groups of 10% and 15%.⁸ Consistently, social bargaining shows better effectiveness in improving the retailer's performance. Compared with firm discounts at 10% ((respectively) resp. 15%), social bargaining lifts sales by 47.71% (resp. 36.60%) and enhances profits by 40.26% (resp. 42.67%). Consistently, social bargaining can better stimulate purchases. It increases purchasing frequency by 0.098 (resp. 0.083) per day, and order value by 7.38 (resp. 6.04) RMB, relative to firm discounts at 10% (resp. 15%). The positive effects on purchasing behaviors are impressive considering the fact that social discounts incur additional costs from the following two factors. First, to obtain social discounts, consumers and social bargainers must spend time and effort in the process of social bargaining. Second, seeking discounts from the social channel incurs social costs (to consumers and social bargainers by association). For example, Ashworth et al. (2005)

Table 2. Effects of Social Pricing (Experiment 1)

The retailer's performance			
Sales	Social pricing– regular pricing	Social pricing– retailer discount (10%)	Social pricing– retailer discount (15%)
Before treatment	2.07%	6.65%	-4.78%
After treatment	82.12%	47.71%	36.60%
Profit			
Profit	Social pricing–regular pricing	Social pricing–retailer discount (10%)	Social pricing–retailer discount (15%)
Before treatment	0.69%	3.39%	-2.67%
After treatment	28.73%	40.26%	42.67%
Purchasing behaviors			
Purchasing frequency	Social pricing– regular pricing	Social pricing–retailer discount (10%)	Social pricing–retailer discount (15%)
Before treatment	0.010 (0.007)	0.006 (0.005)	-0.005 (0.005)
After treatment	0.150** (0.014)	0.098** (0.010)	0.083** (0.009)
DID (after-before)	0.140** (0.017)	0.092** (0.012)	0.088** (0.011)
Order value	Social pricing– regular pricing	Social pricing–retailer discount (10%)	Social pricing–retailer discount (15%)
Before treatment	-1.230 (1.362)	1.170 (1.085)	-0.660 (0.825)
After treatment	10.029** (1.561)	7.383** (1.021)	6.037** (1.072)
DID (after-before)	11.259** (1.874)	6.213** (1.257)	6.697** (1.208)

Notes. This table reports differential effects of the treatment versus control groups before and after the treatment as well as their difference. The before treatment results show there are no significant differences between the treatment and control groups. DID, difference-in-difference.

** $p < 0.05$; * $p < 0.10$.

conclude that consumers will be more active in redeeming a coupon if the discount is provided by the marketer directly through a private channel.

The comparative advantage of social discount over firm discount can be further explained by its higher credibility. Firm-offered discounts are a marketing instrument, whereas social discounts are generated through consumer social interaction. Social interaction has shown better effectiveness than marketing because of higher credibility (Trusov et al. 2009, Mudambi and Schuff 2010). To support the credibility argument, we conduct a survey asking participants' perceived credibility toward the discount they receive in the treatment condition or the firm discount control. The survey is on a seven-point scale (1 = "least credible" and 7 = "most credible") among 50 randomly selected participants from each condition. The survey result shows that participants perceive social discounts as more credible than firm discounts (6.11 versus 3.05; $p < 0.01$).

It is worthwhile to point out that we do not separately analyze the purchases by social bargainers and focal buyers. This is because each consumer in the community could be a focal buyer (who invites social bargaining) as well as a bargainer (who makes social bargaining) at the same time, so it is impossible to separate the influence of social bargaining on bargainers and on focal buyers. Instead, we focus on how social bargaining stimulates purchases of consumers who take these two roles simultaneously.

4.2.2. The Underlying Mechanisms. The main effect of social pricing is generated through consumer social interactions, which consequently cause social influence. However, directly testing the mechanisms of the main effect by constructing a mediator (as in a laboratory experiment) is impracticable in a field experiment because stringent mediating conditions can hardly be satisfied. Thus, we have followed Simester (2017) to employ both interactions and surveys in order to test the mechanisms of social pricing.

We argue that perceived engagement mainly explains the effect of social bargaining on bargainers, and social cost accounts for the effect of social bargaining on focal buyers.⁹ To test the mechanism of social bargaining in increasing purchasing frequency, we estimate the moderating effect of perceived engagement. When recruiting participants, we use a survey to measure the level of engagement of each participant. Specifically, each participant is asked to answer the following question: "Suppose you find a coupon that is strongly desired by your friend. Your friend places an order immediately using your coupon. You feel engaged in this purchase by your friend (1= mostly disagree; 7= mostly agree)." Based on the survey results, we classify participants into high versus low engagement groups.¹⁰ The experimental groups of high and low engagement have average scores of 6.18 and 3.95, respectively. Table 3 shows how the two moderators influence the treatment effects relative to the regular pricing control.¹¹ We

Table 3. The Mechanisms for the Effects of Social Pricing

Panel A: The moderating effect of perceived engagement			
Purchasing frequency	Treatment effect (high engagement)	Treatment effect (low engagement)	High-low
Before treatment	-0.009 (0.007)	-0.007 (0.006)	-0.002 (0.008)
After treatment	0.169** (0.015)	0.108** (0.009)	0.061** (0.020)
DID (after-before)	0.178** (0.018)	0.115** (0.012)	0.063** (0.023)
Order value	Treatment effect (high engagement)	Treatment effect (low engagement)	High-low
Before treatment	1.612 (1.105)	1.287 (1.093)	0.325 (1.129)
After treatment	11.918** (1.640)	8.370** (1.306)	3.548* (1.893)
DID (after-before)	10.306** (1.891)	7.083** (1.655)	3.223* (1.927)
Panel B: The moderating effect of social cost			
Order value	Treatment effect (large social cost)	Treatment effect (small social cost)	Large-small
Before treatment	-1.465 (1.278)	-1.517 (1.171)	0.052 (1.510)
After treatment	15.591** (2.037)	7.010** (1.205)	8.581** (2.408)
DID (after-before)	17.056** (2.590)	8.527** (1.793)	8.529** (2.917)
Purchasing frequency	Treatment effect (large social cost)	Treatment effect (small social cost)	Large-small
Before treatment	0.006 (0.003)	0.009 (0.005)	-0.003 (0.006)
After treatment	0.167** (0.016)	0.139** (0.012)	0.028 (0.019)
DID (after-before)	0.161** (0.017)	0.130** (0.014)	0.031 (0.022)

Notes. The treatment effect is relative to the control of regular pricing. DID, difference-in-difference.

** $p < 0.05$; * $p < 0.10$.

find that the treatment effect on purchasing frequency in the high engagement group is greater than that in the low engagement group (0.169 versus 0.108; $p < 0.05$). Interestingly, in the high engagement group, the treatment effect on order value per purchase is only marginally higher (11.918 versus 8.370; $p < 0.10$). These empirical results together provide strong evidence that perceived engagement is the main mechanism for bargainers to increase purchasing frequency. We have also conducted regression analysis to include other potential determinants as control variables that may influence users' purchasing behaviors. As shown in Online Appendix J, the results remain consistent.

Next, we verify the mechanism of social cost in lifting order value. We also use a survey to measure the perceived social cost of each participant before the experiment. We refer to the survey questions of Brumbaugh and Rosa (2009) in a similar setting of coupon redemption, as shown in Online Appendix E. Using the survey results, we classify participants into high versus low social cost groups, for which the cutoff value is chosen in the same manner as perceived engagement. The experimental groups of high and low social cost have average scores of 5.89 and 3.17, respectively. Table 3 shows that the treatment effect on order value in the sample of high social cost is significantly larger than that in the sample of low social cost (15.591 versus 7.010; $p < 0.05$). Interestingly, the treatment effect on purchasing frequency is comparable (0.167 versus 0.139; $p > 0.10$). The above empirical evidence verifies that the social cost of pursuing social discounts is the main mechanism for consumers to increase order value.

Alternatively, we also report results of an analysis of covariance (ANCOVA) that tests the moderating effects of engagement and social cost. Because the two moderators are numeric variables from a survey, we can include them as moderating variables in the ANCOVA model, in which social bargaining (adoption or not) is a dummy factor, whereas perceived engagement and social cost are continuous factors. The analysis captures the main effect of social bargaining ($F(1, 396) = 107.65, p < 0.0001$) as well as its interaction effect with perceived engagement ($F(1, 396) = 9.33, p < 0.01$) and with social cost ($F(1, 396) = 10.19, p < 0.01$). The results of ANCOVA tests consistently support our findings.

In sum, perceived engagement and social cost are the underlying mechanisms of social pricing, which not only help to increase purchasing frequency but also induce higher order value per purchase. This is in sharp contrast to the mechanisms of other pricing strategies in Section 2.2 that also involve consumer social interactions. Specifically, social priming based on homophily among consumer social networks is the underlying mechanism for sharable coupons (Iyengar and Park 2016). Observational learning is the main

mechanism for the effectiveness of social coupon (e.g., Luo et al. 2014, Subramanian and Rao 2016). Group buying heavily relies on the sales agent mechanism, in which better informed consumers voluntarily act as sales agents to persuade purchases by less-informed consumers (Jing and Xie 2011).

4.2.3. The Motivation of Consumer Social Interaction.

Next, our experiment examines the pattern of consumer social interactions in social bargaining. In our study, the most relevant motivations of social interaction are reciprocity versus altruism.¹² Depending on whether peers' favors in social bargaining are returned or not, the motivations of social interactions can be clarified as reciprocity or altruism. We find that reciprocity is the major motivation, supported by the following evidence. First, we send a survey to 100 randomly selected consumers asking their motivation behind bargaining for peers. The survey offers three options: altruism, reciprocity, and others. The survey results show that 87 consumers choose reciprocity, indicating that people in social bargaining follow a social norm in which "individuals attempt to maintain equity between the benefits they receive and those they bestow" (Shen et al. 2011, p. 273).

Second, we observe back-and-forth bargaining requests between focal buyers and their bargainers. We randomly draw 100 pairs of consumers (a focal buyer and a social bargainer) involved in a bargaining activity for a total of five times and find that an average of 92.4 of them bargain for each other during the experiment period.¹³ This evidence supports the motivation of reciprocity. We further argue that in social bargaining, reciprocity is based on similarity in purchasing frequency. Thus, we observe the gap of purchasing frequency between focal buyers and their bargainers. For 84% of bargaining activities, the gap in purchasing frequency is within one standard deviation. Supported by the above evidence, we conclude that reciprocity leads to homogeneity in consumer social interactions, under which consumers with similar purchasing frequency cluster and bargain for each other.

Third, we further rule out other possible reasons for the bargaining relationship, including making new friends, novelty effect, and social image. We also conduct a network-based analysis by calculating the local clustering coefficient (Watts and Strogatz 1998) to confirm the reciprocity motivation. Details are moved to Online Appendix I for brevity.

4.3. Robustness Checks

In this section, we first show that our results are robust to the alternative setup of online communities. In Experiment 1, we let the retailer form the online community; however, it is also popular for consumers to establish online communities themselves without the

help of online retailers. Here, we show that such an alternative setting will not alter our results. Further, our estimated positive treatment effects of social pricing may be caused by other possible reasons. Thus, in this part of the robustness checks, we discuss how to rule out those possible alternative explanations.

4.3.1. Alternative Setting. The literature has shown that firm-sponsored communities are widely popular among online retailers (e.g., Porter and Donthu 2008, Thompson et al. 2016). As a result, in Experiment 1, each member in the community was randomly assigned by the retailer. Thus, we assume no established social relationship among consumers within the community. Even if this assumption is violated to some extent, the random assignment can ensure the treatment and control communities are homogenous in this aspect. Accordingly, we avoid the manipulation of consumer-formed communities or social networks.

However, we acknowledge that some online retailers adopt alternative methods to form communities. In this subsection, we test whether our findings hold if we add the element of a personal social network, which is still based on a firm-sponsored consumer community but has the characteristic of a personal social network. First, we randomly select an initial community of 100 consumers. Then, each initial member is allowed to invite one peer into the community. We test two ways of incorporating personal social networks: (1) the inviting consumers know the purpose of the community in our experiment (e.g., social pricing) and their invitation decisions are strategically dependent on that purpose, which causes selection bias; (2) the inviting consumers are not aware of the purpose and their invitation decisions would not be subject to selection bias, which is helpful for ensuring internal validity. We test different ways to form consumer communities in order to balance both internal validity and external validity. If we set the community's purpose as known, it is good for external validity but will cause selection bias and thus hurt internal validity. If we set the community's purpose as unknown, it is good for internal validity but will cause imperfection for external validity.

Experiment results are reported in Table 4.¹⁴ Regardless of how consumer communities are constructed, the adoption of social bargaining consistently enhances the retailer's performance (both sales and profits) and boosts purchasing behaviors (purchasing frequency and order value). The comparison shows that both new versions of communities are still effective, where the social interactions still follow the pattern of reciprocity. Thus, as long as social interactions within the community are motivated by reciprocity, both types of communities will generate comparable social pricing effects.

4.3.2. Alternative Explanations. We further exclude several alternative explanations of the effectiveness of social pricing.

1. Gift effect: Both roles of a user may regard social bargaining as a gift. Following Bapna et al. (2016), we observe that the treatment effects persist in the last week of the treatment month and disappear immediately in the first week posttreatment when social bargaining is no longer offered, as shown in Table A.4 (a) in Online Appendix F. Thus, the gift effect cannot explain our findings.

2. Novelty effect: Both bargainers and purchasers may perceive social bargaining as a novel strategy. Manchanda et al. (2015, p. 368) describe the novelty effect as "a short-term effect driven by the novelty of the event." If novelty were the major explanation, the treatment effects would not last long. When we extend the experiment period from a month to three months, the treatment effects are similar, as shown in Table A.4 (b) in Online Appendix F. Considering fresh food is purchased and consumed frequently (up to daily level), we expect that the novelty is exhausted within three months' exposure.

3. Conformity by following others: Conformity can be one of the major mechanisms of social influence (Iyengar et al. 2015, Sun et al. 2019). Bargainers may possess the motivation of conformity by following focal purchasers who invite social bargaining. However, this argument is not supported by empirical results. If conformity is the main mechanism of peer influence under social bargaining, we should observe tendency to the mean: Frequent consumers decrease purchasing frequency, whereas infrequent consumers increase it. We do not observe this pattern in Table 2. Thus, conformity cannot explain our results.

4. Observational learning: Bargainers may learn new products from others' purchases. If observational learning is the major motivation, the additional purchases by bargainers should be used to buy items in focal purchasers' orders. However, we observe that the additional orders of bargainers are mainly used to repeat purchase: only 17% contains new items ordered by the focal purchasers. This empirical evidence helps us exclude the mechanism of observational learning.

5. Perceived control: Literature on participative pricing (e.g., Kim et al. 2009, Barone et al. 2017) suggests purchasers may increase order value for the sake of *perceived control*. Through participating into the pricing decisions (i.e., inviting peers to bargain), consumers gain some control over determining final prices for their purchases. Our experiment has explicitly tested this mechanism by constructing the moderator of perceived control of final prices. As seen in Table A.4 (c) in Online Appendix F, we adapt the survey for measuring perceived control following Hui and Bateson (1991): "If I could impose influence on final price paid for my purchases, I felt in control/dominant/decisive"

Table 4. Robustness Check

Panel A: The purpose of each community is known to users			
The retailer's performance			
Sales	Social pricing–regular pricing	Social pricing–retailer discount (10%)	Social pricing–retailer discount (15%)
Before treatment	2.78%	-1.37%	4.34%
After treatment	86.33%	50.33%	39.74%
Profit	Social pricing–regular pricing	Social pricing–retailer discount (10%)	Social pricing–retailer discount (15%)
Before treatment	1.30%	-0.84%	2.18%
After treatment	30.57%	43.61%	46.65%
Purchasing behaviors			
Purchasing frequency	Social pricing–regular pricing	Social pricing–retailer discount (10%)	Social pricing–retailer discount (15%)
Before treatment	0.005 (0.011)	-0.007 (0.011)	0.008 (0.007)
After treatment	0.171** (0.016)	0.117** (0.012)	0.103** (0.008)
DID (after–before)	0.166** (0.021)	0.124** (0.015)	0.095** (0.010)
Order value	Social pricing–regular pricing	Social pricing–retailer discount (10%)	Social pricing–retailer discount (15%)
Before treatment	0.822 (0.875)	1.021 (1.175)	1.052 (0.971)
After treatment	10.856** (1.424)	8.873** (1.207)	7.819** (1.037)
DID (after–before)	10.034** (1.617)	7.852** (1.683)	6.767** (1.245)
Panel B: The purpose of each community is not known to users			
The retailer's performance			
Sales	Social Pricing–Regular Pricing	Social Pricing–Retailer Discount (10%)	Social Pricing–Retailer Discount (15%)
Before treatment	-1.36%	-3.13%	-0.65%
After treatment	78.46%	45.66%	36.97%
Profit	Social Pricing–Regular Pricing	Social Pricing–Retailer Discount (10%)	Social Pricing–Retailer Discount (15%)
Before treatment	-0.71%	-1.19%	-1.15%
After treatment	26.03%	38.35%	39.18%
Purchasing behaviors			
Purchasing frequency	Social pricing–regular pricing	Social pricing–retailer discount (10%)	Social pricing–retailer discount (15%)
Before treatment	0.010 (0.012)	-0.005 (0.009)	-0.009 (0.010)
After treatment	0.139** (0.015)	0.108** (0.011)	0.086** (0.012)
DID (after–before)	0.129** (0.021)	0.113** (0.015)	0.095** (0.017)
Order value	Social pricing–regular pricing	Social pricing–retailer discount (10%)	Social pricing–retailer discount (15%)
Before treatment	-1.270 (1.219)	-1.653 (1.550)	0.920 (0.965)
After treatment	9.891** (1.237)	7.565** (1.109)	7.123** (0.987)
DID (after–before)	11.161** (1.653)	9.218** (1.835)	6.203** (1.256)

Note. DID, difference-in-difference.

** $p < 0.05$; * $p < 0.10$.

(1 = strongly disagree and 7 = strongly agree). According to the sample median of the survey results, we classify users into two segments of high versus low perceived control (the average score is 5.23 versus 2.78). We find the treatment effects on purchasing frequency and order value are comparable between these two segments.

6. Discount effect: Purchasers may perceive social bargaining attractive simply because it can generate discounts for their purchases. Our experiment constructs control conditions of different discount levels that generate comparable discounts offered by the firm. The empirical results show superiority of the treatment group against the firm discount control and thus exclude the alternative explanation of discount effect.

In addition, following the suggestion of Hartmann et al. (2008), our study adopts a difference-in-differences (DID) analysis. In this way, the empirical analysis controls for common unobservables in different experimental conditions. In particular, our study controls for marketing efforts as suggested by prior studies (Iyengar et al. 2011a, Kumar and Tan 2015). During the experiment period, the retailer runs no advertising campaigns or sales promotions.

5. Experiment 2

Experiment 1 shows that social bargaining can positively influence purchasing behaviors (purchasing frequency and order value) and consequently improve retailer performance (sales and profits). These positive

influences are largely generated through consumer social interactions in the process of social bargaining. In Experiment 1, we find that users with similar purchasing frequency bargain for each other. In Experiment 2, we require focal buyers invite bargainers with different purchasing frequency.

5.1. Motivation

Although the social pricing strategy achieves impressive performance in Experiment 1, we are not sure if such homogeneity-driven social interactions are optimal in influencing peer purchases. In our context of repeated purchase, homogeneity (the clustering of consumers with similar purchasing frequency) may not be healthy in promoting repeat purchases. For frequent consumers, their potential for more active purchasing behaviors is limited. For infrequent consumers, they lack a role model as the source of positive influence. To resolve this dilemma, Experiment 2 designs the rule based on difference in purchasing frequency. Specifically, we require that focal buyers can only invite peers with higher purchasing frequency by one standard deviation as their social bargainers. Later, we discuss why one standard deviation is appropriate for the heterogeneity rule. Thus, focal buyers and social bargainers are *heterogenous* in their purchasing frequency. The retailer claims that consumers of higher purchasing frequency are VIPs and thus are given the privilege of bargaining for lower-frequency peers. During the experiment, purchasing frequency (based on the previous seven days) is updated dynamically. Thus, the heterogeneity rule is enforced in a dynamic manner. The other settings are identical to Experiment 1.

Under this heterogeneity rule, for each pair of consumers involved in a bargaining transaction (a focal buyer and a social bargainer), the former can send the bargaining request to the latter but not vice versa. The latter must seek peers with even higher purchasing frequency as potential bargainers. We argue that consumers perceive indirect reciprocity in heterogeneity-based social bargaining because their favor of bargaining for peers of lower purchasing frequency would be returned by peers of higher purchasing frequency.

Nowak and Sigmund (2005, p. 1291) define indirect reciprocity as the notion that “I help you and somebody else helps me.” Consider consumers A, B, and C in ascending order of purchasing frequency (by at least one standard deviation); in indirect reciprocity, B bargains for A and C bargains for B. Nowak and Sigmund (2005) claim that those who violate indirect reciprocity (B enjoys social bargaining by C but is not willing to bargain for A) will suffer from reputation loss. To verify indirect reciprocity under our heterogeneity rule, we interview 10 random consumers asking why they are willing to bargain for others without receiving a return directly. Seven consumers claim

explicitly that they bargain for lower-frequency peers because they expect to receive similar help from higher-frequency peers.

Two important points merit additional discussion. First, to develop indirect reciprocity, consumers of top purchasing frequency should be willing to buy without a social discount and bargain for peers without any return, directly or indirectly. This condition can be satisfied without firm interference, as top consumers are usually advocates of the product. In this case, they hold strong beliefs that people should eat healthier food (e.g., fresh food or organic food) rather than frozen food or fast food. Alternatively, retailers may use various incentives, such as targeted discounts or certificates of community status, to encourage top consumers to help others. Second, we argue that consumers tend to invite bargainers who are close in purchasing frequency for the sake of social cost. If bottom-frequency consumers invite top-frequency peers to bargain, the consumers' benefit from social bargaining could hardly match the effort of the bargainers who are VIPs with top status. Accordingly, social cost of focal consumers and social bargainers by association would be high. Moreover, consumers may have difficulty finding bargainers who differ dramatically in purchasing behaviors.

Under the heterogeneity rule, consumers feel superior about being qualified as social bargainers but feel inferior otherwise. In each act of social bargaining, upward and downward comparisons occur between focal consumers and their bargainers. Inferiors (i.e., the focal consumers) who make upward comparisons with superiors (i.e., social bargainers) tend to enhance themselves if the superiors' success is attainable (Lockwood and Kunda 1997, 1999). Superiors (i.e., social bargainers) who conduct downward comparisons with inferiors (i.e., the focal consumers) would actively boost themselves to avoid the negative experience of the inferiors (Lockwood 2002). We deliberately choose one standard deviation as the gap of purchasing frequency, so that the inferiors feel encouraged in making upward comparisons and the superiors feel alarmed when conducting downward comparisons (Dreze and Nunes 2009). Both types of social comparisons lead to positive peer influence.

5.2. Results

Table 5 reports summary statistics and correlation coefficients of purchasing behaviors in the treatment group. An average consumer subject to the new treatment has 5.65 social bargainers for each purchase, enjoying a social discount of 17.08%. The consumer purchases at a frequency of 0.58 per day on average, each time ordering an average of 60.73 RMB worth of fresh food.

As expected, we observe no correlation between a consumer's purchasing frequency and the number of social bargainers ($\rho = 0.09; p > 0.10$). This result suggests that

Table 5. Purchasing Behaviors in the Treatment Group (Experiment 2)

	Summary statistics		Correlation			
	Mean	Standard deviation	1	2	3	4
1. Average social discount (%)	17.08	13.60	1.00			
2. Number of social bargainers	5.65	4.84	0.93**	1.00		
3. Purchasing frequency	0.58	0.36	0.11	0.09	1.00	
4. Order value	60.73	38.44	0.28**	0.21**	0.08	1.00

** $p < 0.05$; * $p < 0.10$.

consumers in different segments of purchasing frequency have similar difficulty in finding social bargainers. The treatment effects on retailer performance and purchasing behaviors are reported in Table 6. Consistently, the adoption of social bargaining increases sales by 109.39% and profits by 40.18% relative to regular pricing. Compared with firm discounts at 15% (resp. 20%) (the average social discount 17.08% is in between), social pricing increases sales by 62.98% (resp. 46.87%) and profits by 57.24% (resp. 61.32%). Thus, social bargaining in Experiment 2 leads to a larger growth of sales and profits.

Next, social bargaining increases purchasing frequency by 0.22 per day relative to regular pricing and by 0.16 (resp. 0.12) relative to firm discounts at 15% (resp. 20%). It also increases order value by 15.27 RMB relative to regular pricing and by 10.48 (resp. 8.60) relative to firm discounts at 15% (resp. 20%). Again, social bargaining in Experiment 2 can better enhance purchasing frequency and order value. Because the two experiments differ only in the rules of social bargaining, we conclude that social interactions among consumers with different (versus similar) purchasing behaviors can be superior in promoting repeat purchases.

In Experiment 2, two conditions are critical for social bargaining to achieve desired performance. First, we argue that a close gap in purchasing frequency (one standard deviation) motivates positive peer influence in both upward and downward comparisons. To verify the importance of the appropriate gap in purchasing frequency, we also test a gap of two or three standard deviations. We find increasing the gap of purchasing frequency weakens the treatment effects.¹⁵ In one aspect, a large gap weakens the effects of upward and downward comparisons. In another aspect, an excessive gap imposes difficulties for consumers to find bargainers. We deliberately choose one standard deviation to develop the heterogeneity rule. Further, our arguments about the positive peer influence in upward and downward comparisons are based on one important assumption: Consumers tend to invite bargainers who are close in purchasing frequency. The experiment result verifies this assumption: Over the one-month experiment period, the majority of social bargainers are just above one SD in purchasing frequency (63% are within 1.0–1.5 SDs; 29% within 1.5–2.0 SDs; only 8% beyond 2.0 SDs).

Second, we observe the pattern of indirect reciprocity among consumers in vertical tiers of purchasing

Table 6. Effects of Social Pricing in Experiment 2

The retailer's performance			
Sales	Social pricing–regular pricing	Social pricing–retailer discount (15%)	Social pricing–retailer discount (20%)
Before treatment	4.07%	-8.23%	-1.46%
After treatment	109.39%	62.98%	46.87%
Profit			
Profit	Social pricing–regular pricing	Social pricing–retailer discount (15%)	Social pricing–retailer discount (20%)
Before treatment	2.27%	-4.19%	-1.07%
After treatment	40.18%	57.24%	61.32%
Purchasing behaviors			
Purchasing frequency	Social pricing–regular pricing	Social pricing–retailer discount (15%)	Social pricing–retailer discount (20%)
Before treatment	0.011 (0.015)	-0.007 (0.007)	0.006 (0.008)
After treatment	0.217** (0.018)	0.158** (0.019)	0.125** (0.012)
DID (after-before)	0.206** (0.023)	0.165** (0.021)	0.119** (0.014)
Order value	Social pricing–regular pricing	Social pricing–retailer discount (15%)	Social pricing–retailer discount (20%)
Before treatment	0.553 (1.069)	-1.610 (1.507)	-1.811 (1.250)
After treatment	15.273** (2.017)	10.483** (1.465)	8.598** (1.279)
DID (after-before)	14.720** (2.457)	12.093** (1.872)	10.409** (1.521)

Notes. This table reports differential effects of the treatment versus control groups before and after the treatment as well as their difference. The before treatment results show there are no significant differences between the treatment and control groups.

** $p < 0.05$; * $p < 0.10$.

frequency. A necessary condition to form this pattern of social bargaining is that consumers of top purchasing frequency voluntarily bargain for others out of altruism, and our results confirm this. Furthermore, such consumers still purchase actively even though they cannot enjoy social discounts; for example, top consumers are more interested in advocating the philosophy of healthy food. Consumers of other e-commerce businesses (not limited to organic products or ecological products) may have similar belief to promote the products that they consume frequently. Firms can encourage top-frequency purchasers to bargain for peers. For example, firms may reward active purchasers an honor badge or VIP status as virtual recognition. Firms may also consider monetary incentives, such as firm-initiated discounts or VIP coupons, to encourage top-frequency purchasers to bargain for peers in order to generate heterogeneity-based social pricing effect.

So far, we have focused on one direction of heterogeneity, that is, social bargainers must have higher purchasing frequency than focal buyers. It is natural to ask whether the reverse is true, that focal buyers must have higher purchasing frequency. We report relevant experimental results in Online Appendix H. Interestingly, under the reverse heterogeneity rule, the advantages of social bargaining remain. In either direction of heterogeneity, the social interactions driven by social bargaining generate two forms of social comparisons: upward and downward comparisons. We have argued that either form of social comparison causes positive peer influence.

6. Discussion and Conclusion

Social pricing has been widely popular among online retailers, but its value and mechanism remain unclear because of a lack of rigorous research. In this study, we designed and conducted randomized field experiments to fill this important gap. Specifically, our study focuses on social bargaining, a popular strategy of social pricing implementation in which consumers can invite peers to bargain for their purchase. Our analysis reveals that compared with conventional nonsocial pricing strategies (regular pricing and firm-initiated discounts), social pricing significantly stimulates purchases and considerably improves profitability.

From a theoretical perspective, our research documents a new way of implementing price discrimination. That is, firms can charge different prices to consumers based on their different social capital. The novelty of our research is that traditional price discrimination is typically based on a consumer's individual value, whereas social pricing hinges on a consumer's social value. From a practical perspective, within the background of social commerce in

particular, our research not only draws attention to online retailers' need to integrate pricing decisions with consumers' social capital but also provides managerial insights regarding how to better design their social pricing strategies.

6.1. Managerial Implications

Our findings offer valuable insights to the practice of social commerce. In order to successfully launch social pricing, we provide suggestions in four areas that retailers can actively control: (1) how to target consumers, (2) how to choose products, (3) how to establish social networking platforms, and (4) how to design consumer social interactions in social commerce.

To begin with, what types of consumers are attracted by social pricing? The social pricing framework can be generalized to any implementation that offers different prices to consumers with different social value. Our research chooses social bargaining as the specific implementation of social pricing. The specific findings under social bargaining (including the main effects and the underlying mechanisms) can also be generalized as long as the following conditions about consumer characteristics are satisfied: (1) users have the intention to pursue lower prices; (2) social interactions between users are mainly driven by reciprocity; (3) engagement into peers' purchases will enhance focal users' intention to purchase; (4) a focal user's public pursuit of saving will generate social cost of being perceived as social stigma. Our findings also apply generally to consumers of different demographics (including gender, age, occupation, and income).

Second, what types of products are suitable for social pricing? We expect that social pricing would be appealing to retailers in various categories and can achieve better effectiveness in product categories with higher purchasing frequency, for example, nondurable goods or frequently used service products. High purchasing frequency results in frequent social interactions, which in turn leads to a large peer influence of social pricing. Thus, we acknowledge that the effects of social pricing may be more salient in our product category with higher purchasing frequency. However, consumers of fresh food are very comprehensive in demographics and thus can well represent the population of consumers, whose social interactions are expected to be representative.

Third, how should retailers establish the social networking platform to facilitate social pricing? In the main experiment, we test whether the treatment effects are robust to how the platform (an online consumer community) is formed. We find that the positive effects hold consistently regardless of whether the consumer community is specified by the retailer directly or is formed by consumers independently. Thus, we suggest that retailers should allow flexibility

in forming platforms for social pricing. It is worth noting that the pattern of consumer social interactions is determined by consumers' motivations in social pricing. Consumers are willing to use social resources in exchange for attractive price discounts. In addition, consumers are reciprocal in requesting and returning the favor of social pricing. As long as these motivations remain, the effects of social pricing should be consistent regardless of how the social networking platform is formed.

Fourth, how should firms design consumer social interaction under social pricing? In our research setting, consumers are required to initiate social interactions in exchange for a cheaper price. By designing different rules of social pricing, retailers can guide social interactions toward a desired pattern. In Experiment 2, we require that social bargainers have higher purchasing frequency than focal consumers who initiate social pricing. Consequently, we observe that consumers actively interact with peers with higher purchasing frequency to pursue social discounts. Our experiments indicate that social interactions among consumers who are heterogeneous (versus homogeneous) in purchasing behaviors can better promote repeat purchases. Thus, retailers can design rules of social pricing to determine the pattern of social interactions, which in turn determines the effectiveness of social pricing. We suggest that retailers targeting a commercial goal should design relevant rules of social pricing to guide consumer social interaction toward that goal. For example, to encourage cross-buying, retailers may require consumers to choose peers who mainly purchase in another category as bargainers.

6.2. Future Research

Our exploratory study of social pricing provides several promising avenues for future research. To begin with, the current study focuses on how social pricing stimulates purchases of *existing consumers*. We do not consider *new consumers* to secure unbiased estimates of the causal effects and thus forfeit the potential of referring prospective consumers. Future research can study the impact of social pricing on new customer acquisition. Second, we conduct our field experiments in firm-initiated communities to ensure rigorous between-group comparisons. However, using personal social networks is also popular and convenient to implement. The key component is that the consumers' purpose of social interactions is to gain social discounts rather than to develop friendship. When purchasers can gain the same benefit (a social discount) by socializing with either strangers or friends, getting help from friends may be easier (positive effect); but it also generates more social cost if the bargaining requests are between friends (negative effect). We leave

the investigation into personal networks to future research, that is, whether and when the overall effect is positive. Third, this study focuses on the purchasing frequency aspect when considering the heterogeneity rule. Future research can include customer demographics, purchasing categories, or consumers' privacy preferences (e.g., Acquisti et al. 2015) to further understand the heterogeneity design of social pricing. Next, this research compares aggregate-level firm performance due to the retailer's data management policy. The availability of individual-level profit data may lead to interesting new results in future research. Finally, our research setting refrains the total social discount to be capped at 30%. Future research can explore a more aggressive setting of no discount cap, and consumers with a strong network can generate very high total discount or even get the product for free. Overall, the current study presents the first step toward understanding the value and mechanisms of social pricing.

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Endnotes

¹ See <https://m.banggood.com/slash.html>; https://pages.lazada.sg-wow/i_sg/SGCampaign/how-to-slash-it/; <https://www.bigtricks.in/club-factory-slash-the-price/> (accessed on November 8, 2021).

² See <http://www.quanmama.com/quan/2490048.html>; <https://post.smzdm.com/p/aqnd94vp> (accessed on November 8, 2021).

³ The name of the company has been concealed because of the non-disclosure agreement.

⁴ Identifying social influence through observational data has been challenging. Prior studies (e.g., Godes and Mayzlin 2004, Iyengar et al. 2011b, Bapna and Umyarov 2015) advocate that a more appropriate way to identify the causal effects of social influence is to conduct randomized field experiments, where the treatment and control groups differ only in the relevant social variable. Then the resulted difference can be attributed to social influence, preventing or minimizing potential biases caused by self-selection, homophily, and unobserved heterogeneity.

⁵ It is worthwhile to note that forming firm-initiated communities of strangers is a prevalent practice and is attractive to consumers in the social commerce market where the experiments were conducted. Consistently, we observe that all groups of randomly selected consumers are eager to join the communities for the discount opportunities or information sharing.

⁶ We would like to point out that firm's sales to individual consumers are equivalent to individual consumers' purchases from the firm. Thus, individual level purchasing behaviors can represent the firm's sales performance.

⁷ For all the tables in this study, the numbers in parentheses refer to standard errors.

⁸ We also report the comparison results of the other firm-discount control groups (5%, 20%, and 25%) in Online Appendix C. The results show that the benefits of social bargaining are consistent.

⁹ Detailed discussion and empirical results are shown in Online Appendix L.

¹⁰ The cutoff value for high or low levels of engagement and social cost is set above or below the median of the randomly selected sample of consumers.

¹¹ Table 3 demonstrates the moderating effects relative to regular pricing. Online Appendix D shows that the moderating effects are robust under the firm discount control groups (10% and 15%) as well.

¹² It is also worth noting the simultaneous roles of a user (i.e., a purchaser and a bargainer) in social pricing contribute to the reciprocity pattern of social interactions, creating impressive social influence as shown in our study. If we allow a user to be either a pure bargainer or a pure purchaser, consumer interactions will become purely altruistic rather than reciprocal. Such social interactions (pure help without any return) could not sustain in the long term, which might be the reason such practice (pure bargainers and pure purchasers) cannot be found in the marketplace. We show a possible theoretical and empirical decomposition in Online Appendix K.

¹³ In the five random draws, 88, 91, 93, 94, and 96 pairs bargained for each other respectively, with an average of 92.4.

¹⁴ In both scenarios, the average social discount generated in the treatment conditions is about 12%. Thus, we present the results when the firm offers the discount at 10% and 15%. Our results are also robust to other firm discount levels, but the details are omitted for brevity.

¹⁵ Results of robustness checks under the heterogeneity rule are available in Online Appendix G.

References

- Acquisti A, Brandimarte L, Loewenstein G (2015) Privacy and human behavior in the age of information. *Science* 347(6221): 509–514.
- Adler PS, Kwon SW (2002) Social capital: Prospects for a new concept. *Acad. Management Rev.* 27(1):17–40.
- Argo J, Main KJ (2008) Stigma by association in coupon redemption: Looking cheap because of others. *J. Consumer Res.* 35(4): 559–572.
- Ashworth L, Darke PR, Schaller M (2005) No one wants to look cheap: Trade-offs between social disincentives and the economic and psychological incentives to redeem coupons. *J. Consumer Psych.* 15(4):295–306.
- Bapna R, Umyarov A (2015) Do your online friends make you pay? A randomized field experiment on peer influence in online social networks. *Management Sci.* 61(8):1902–1920.
- Bapna R, Ramaprasad J, Shmueli G, Umyarov A (2016) One-way mirrors in online dating: A randomized field experiment. *Management Sci.* 62(11):3100–3122.
- Barone MJ, Bae TJ, Qian S, d'Mello J (2017) Power and the appeal of the deal: How consumers value the control provided by pay what you want (PWYW) pricing. *Marketing Lett.* 28(3): 437–447.
- Besanko D, Dubé JP, Gupta S (2003) Competitive price discrimination strategies in a vertical channel using aggregate retail data. *Management Sci.* 49(9):1121–1138.
- Biyalogorsky E, Gerstner E (2004) Contingent pricing to reduce price risks. *Marketing Sci.* 23(1):146–155.
- Brumbaugh AM, Rosa JA (2009) Perceived discrimination, cashier metaperceptions, embarrassment, and confidence as influencers of coupon use: An ethnoracial–socioeconomic analysis. *J. Retailing* 85(3):347–362.
- Busalim AH, Hussin ARC (2016) Understanding social commerce: A systemic literature review and directions for future research. *Internat. J. Inform. Management* 36(6):1075–1088.
- Carbone I (2018) *How to Build, Nurture, and Leverage Your Network to Achieve Your Personal and Professional Goals* (Information Age Publishing, Charlotte, NC).
- Centola D (2010) The spread of behavior in an online social network experiment. *Science* 329(5996):1194–1197.
- Centola D (2011) An experimental study of homophily in the adoption of health behavior. *Science* 334(6060):1269–1272.
- Dana JD (1998) Advance-purchase discounts and price discrimination in competitive markets. *J. Political Econom.* 106(2):395–422.
- Dreze X, Nunes JC (2009) Feeling superior: The impact of loyalty program structure on consumers' perceptions of status. *J. Consumer Res.* 35(6):890–905.
- Gao H, Zhao H, Tan Y, Lin Y, Wei L (2020) Social promotion: A creative promotional framework on consumers' social network value. *Production Oper. Management* 29(12):2661–2678.
- Godes D, Mayzlin D (2004) Using online conversations to study word-of-mouth communication. *Marketing Sci.* 23(4):545–560.
- Graziani T (2018) Pinduoduo: A close look at the fastest growing app in China. Accessed November 8, 2021, <https://www.techinasia.com/talk/pinduoduo-fastest-growing-app-china>.
- Hartmann WR, Manchanda P, Nair H, Bothner M, Dodds P, Godes D, Hosanagar K, Tucker C (2008) Modeling social interactions: Identification, empirical methods and policy implications. *Marketing Lett.* 19(3-4):287–304.
- Huang N, Hong Y, Burch G (2017) Social network integration and user content generation: Evidence from natural experiments. *MIS Quart.* 41(4):1035–1058.
- Hui MK, Bateson JEG (1991) Perceived control and the effect of crowding and consumer choice on the service experience. *J. Consumer Res.* 18(2):174–184.
- Joo YH, Kim Y, Yang SJ (2011) Valuing customers for social network services. *J. Bus. Res.* 64(11):1239–1244.
- Iyengar R, Park YH (2016) The impact of referral coupons on customer behavior and firm revenues: Evidence from field experiments. MSI Report, No.16-123, New York.
- Iyengar R, Van den Bulte C, Lee JY (2015) Social contagion in new product trial and repeat. *Marketing Sci.* 34(3):408–429.
- Iyengar R, Van den Bulte C, Valente TW (2011a) Opinion leadership and social contagion in new product diffusion. *Marketing Sci.* 30(2):195–212.
- Iyengar R, Van den Bulte C, Valente TW (2011b) Rejoinder-further reflections on studying social influence in new product diffusion. *Marketing Sci.* 30(2):230–232.
- Jing X, Xie J (2011) Group buying: A new mechanism for selling through social interactions. *Management Sci.* 57(8):1354–1372.
- Katona Z, Zubsek PP, Savary M (2011) Network effects and personal influences: The diffusion of an online social network. *J. Marketing Res.* 48(3):425–443.
- Kim JY, Natter M, Spann M (2009) Pay what you want: A new participative pricing mechanism. *J. Marketing* 73(1):44–58.
- Kumar N, Qiu L, Kumar S (2018a) Exit, voice, and response in digital platforms: An empirical investigation of online management response strategies. *Inform. Systems Res.* 29(4):849–870.
- Kumar N, Venugopal D, Qiu L, Kumar S (2018b) Detecting review manipulation on online platforms with hierarchical supervised learning. *J. Management Inform. Systems* 35(1):350–380.
- Kumar N, Venugopal D, Qiu L, Kumar S (2019) Detecting anomalous online reviewers: An unsupervised approach using mixture models. *J. Management Inform. Systems* 36(4):1313–1346.
- Kumar S, Qiu L (2021) *Social Media Analytics and Practical Applications: The Change to the Competition Landscape* (CRC Press, Boca Raton, FL).
- Kumar V, Rajan B (2012) Social coupons as a marketing strategy: A multifaceted perspective. *J. Acad. Marketing Sci.* 40(1):120–136.

- Kumar A, Tan Y (2015) The demand effects of joint product advertising in online videos. *Management Sci.* 61(8):1921–1937.
- Kumar S, Tan Y, Wei L (2020) When to play your advertisement? Optimal insertion policy of behavioral advertisement. *Inform. Systems Res.* 31(2):589–606.
- Lee E (2018) The incredible rise of Pinduoduo, China's newest force in E-commerce. Accessed November 8, 2021, <https://techcrunch.com/2018/07/26/the-incredible-rise-of-pinduoduo/>.
- Lockwood P (2002) Could it happen to you? Predicting the impact of downward comparisons on the self. *J. Personality Soc. Psych.* 82(3):343–358.
- Lockwood P, Kunda Z (1997) Superstars and me: Predicting the impact of role models on the self. *J. Personality Soc. Psych.* 73(1):91–103.
- Lockwood P, Kunda Z (1999) Salient best selves can undermine inspiration by outstanding role models. *J. Personality Soc. Psych.* 76(2):214–228.
- Luo X, Andrews M, Song Y, Aspara J (2014) Group-buying deal popularity. *J. Marketing* 78(2):20–33.
- Mallipeddi R, Janakiraman R, Kumar S, Gupta S (2021a) The effects of social media content created by human brands on engagement: Evidence from Indian general election 2014. *Inform. Systems Res.* 32(1):212–237.
- Mallipeddi R, Kumar S, Sriskandarajah C, Zhu Y (2021b) A framework for analyzing influencer marketing in social networks: Selection and scheduling of influencers. *Management Sci.*, ePUB ahead of print February 17, <https://doi.org/10.1287/mnsc.2020.3899>.
- Manchanda P, Packard G, Pattabhiramaiah A (2015) Social dollars: The economic impact of customer participation in a firm-sponsored online customer community. *Marketing Sci.* 34(3):367–387.
- Mudambi SM, Schuff D (2010) What makes a helpful online review? A study of customer reviews on Amazon.com. *MIS Quart.* 34(1):185–200.
- Nahapiet J, Ghoshal S (1998) Social capital, intellectual capital, and the organizational advantage. *Acad. Management Rev.* 23(2):242–266.
- Nowak MA, Sigmund K (2005) Evolution of indirect reciprocity. *Nature* 437(7):1291–1298.
- Pancras J, Sudhir K (2007) Optimal marketing strategies for a customer data intermediary. *J. Marketing Res.* 44(4):560–578.
- Park J, John D (2010) Got to get you into my life: Do brand personalities rub off on consumers? *J. Consumer Res.* 37(4):655–669.
- Porter CE, Donthu N (2008) Cultivating trust and harvesting value in virtual communities. *Management Sci.* 54(1):113–128.
- Qiu L, Kumar S (2017) Understanding voluntary knowledge provision and content contribution through a social-media-based prediction market: A field experiment. *Inform. Systems Res.* 28(3):529–546.
- Qiu L, Shi Z, Whinston A (2018) Learning from your friends' check-ins: An empirical study of location-based social networks. *Inform. Systems Res.* 29(4):1044–1061.
- Raj H (2018) PUBG mobile tips: How to get your favorite skins for free. Accessed November 8, 2021, <https://www.sportskeeda.com/esports/pubg-mobile-tips-how-to-get-your-favorite-skins-for-free>.
- Schau HJ, Muñiz AM, Arnould EJ (2009) How brand community practices create value. *J. Marketing* 73(5):30–51.
- Scott J (2000) *Social Network Analysis: A Handbook* (Sage Publications, London).
- Shaffer G, Zhang J (2002) Competitive one-to-one promotions. *Management Sci.* 48(9):1143–1160.
- Simester D (2017) Field experiments in marketing. *Handbook of Field Experiments*, vo1. 1 (Elsevier, Amsterdam), 465–497.
- Shen J, Eder LB (2011) An examination of factors associated with user acceptance of social shopping websites. *Internat. J. Tech. Human Interaction* 7(1):19–36.
- Shen H, Wan F, Wyer RS (2011) Cross-cultural differences in the refusal to accept a small gift: The differential influence of reciprocity norms on Asians and North Americans. *J. Personality Soc. Psych.* 100(2):271–281.
- Statista (2021) Most popular global mobile messenger apps. Accessed November 8, 2021, <https://www.statista.com/statistics/258749/most-popular-global-mobile-messenger-apps/>.
- Subramanian U, Rao RC (2016) Leveraging experienced consumers to attract new customers: An equilibrium analysis of displaying deal sales by daily deal websites. *Management Sci.* 62(12):3555–3575.
- Sun M, Zhang X, Zhu F (2019) U-shaped conformity in online social networks. *Marketing Sci.* 38(3):461–480.
- Thompson SA, Kim M, Smith KM (2016) Community participation and consumer-to-consumer helping: Does participation in third party-hosted communities reduce one's likelihood of helping? *J. Marketing Res.* 53(2):280–295.
- Tokman M, Davis LM, Lemon KN (2007) The WOW factor: Creating value through win-back offers to reacquire lost customers. *J. Retailing* 83(1):47–64.
- Trusov M, Bucklin RE, Pauwels K (2009) Effects of word-of-mouth vs. traditional marketing: Findings from an internet social networking site. *J. Marketing* 73(5):90–102.
- Tucker C, Zhang J (2011) How does popularity information affect choices? A field experiment. *Management Sci.* 57(5):828–842.
- Wang C, Zhang P (2012) The evolution of social commerce: An examination from the people, business, technology, and information perspective. *Comm. Assoc. Inform. Systems* 31(5):105–127.
- Wang M, Ma M, Yue X, Mukhopadhyay S (2016) A capacitated firm's pricing strategies for strategic consumers with different search costs. *Ann. Oper. Res.* 240(2):731–760.
- Wasserman S, Faust K (1994) *Social Network Analysis: Methods and Applications* (Cambridge University Press, New York).
- Watts DJ, Strogatz SH (1998) Collective dynamics of small-world networks. *Nature* 393:440–442.
- Zhang B, Pavlou PA, Krishnan R (2018) On direct vs. indirect peer influence in large social networks. *Inform. Systems Res.* 29(2):292–314.
- Zhao K, Zhao X, Deng J (2015) Online price dispersion revisited: How do transaction prices differ from listing prices? *J. Management Inform. Systems* 32(1):261–290.