Designing Promotion Incentive to Embrace Social Sharing: Evidence from Field and Lab Experiments

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Abstract

This study examines whether and how firms can design novel incentives to engage customers in this social sharing era. In collaboration with a leading online deal platform, we conduct a large-scale randomized field experiment and two lab experiments to test the effectiveness of different incentive designs (varied by shareability and scarcity of promotion codes) in driving social sharing senders' purchase and referrals. We find that providing senders with one non-shareable promo code significantly increases their purchase likelihood but does not influence their referrals. In contrast, the senders who receive one shareable code are less likely to purchase themselves yet are more likely to make successful referrals. Meanwhile, the incentive design with two codes that has one non-shareable code and one shareable code increases neither the senders' purchase nor their successful referrals. We further conduct two lab experiments on Amazon Mechanical Turk to explore the underlying mechanisms of the observed relationships.

Keywords: social sharing, incentive design, randomized field experiment, lab experiments

Introduction

Online social platforms such as *Facebook*, *Pinterest*, *Groupon* and *LivingSocial* have significantly boosted the prevalence of social sharing by making it convenient for customers to distribute product information within their social connections (Gerlitz and Helmond 2013). A substantial volume of product information is being shared on these platforms every day (Nielsen 2016). Recognizing the trend, a large number of businesses have leveraged the online social platforms and channels (Facebook, Twitter, Yelp) and embraced social sharing as an effective approach to drive organic traffic (John 2013, Godes et al. 2005). Social sharing is now increasingly enabled by digital technology and becomes an IT artifact. For instance, major Ecommerce platforms such as Groupon and Amazon has all integrated social features and channels on its product pages to facilitate immediate sharing of the products with friends (Huang et al. 2018). While the impact of IT-enabled social sharing and WOM on customers' decision is intensively studied in a number of seminal papers (Godes et al. 2009, Yin et al. 2016), the implications of such IT-enabled social sharing on

the design of firm's direct communication strategy to the customers has been largely ignored in both academic research or practical study. Specifically, given the increasing connectivity among customers and the very low cost of social sharing enabled by IT, it is important for firms to revisit their current practice in the social media era: *Should firms engage customers as isolated and independent 'purchasers', or as both 'purchasers' and 'sharers' that are interconnected to each other? How should firms design incentive differently to engage the customers across both roles?* Our study is aiming to address these questions.

Despite the importance of promotional incentive design as a key strategy in firm's communication with customers, to the best of our knowledge, no study has directly examined this question with the consideration that the customers have the motives and can increasingly share with each other. The idea of designing targeting incentives that accommodate or even encourage social sharing remains vastly under-explored. Previous research on social sharing has mostly focused on understanding the reasons why social sharing occurs (Wasko and Faraj 2005; Berge and Milkman 2012), how to encourage social sharing behaviors (Ryu and Feick 2007), how to better design social sharing programs (Hong et al. 2017, Sun et al. 2017), and the impact of social shares on others' purchase behaviors (Aral and Walker 2011; Bapna and Umyarov 2015; Kim and Srivastava 2007). Our study aims to fill this gap in the literature by examining how firms can engage users involved in social sharing through optimal incentive designs. We theorize and empirically demonstrate that firms could take advantage of IT-enable social sharing and leverage customers' sharing motives (e.g. other-regarding motives) in designing incentives when reaching out the customers. If well designed, social sharing among customers may help firms overcome the information asymmetry in targeting and allocate the promotional incentive to the right customers with the best fit in preference. In this way, both firm's profits and the customer welfare may be significantly improved.

The goal of our study is two-fold. From a theoretical perspective, our study aims to shed light on the motive underlying customers' social sharing behaviors. Previous literature carefully examined the sharing motive in the lab setting (Hong et al. 2016, Berger and Milkman 2012), our study complements and extends the previous lab experiments and suggest a potential way to examine sharing motives in the field. The response of customers towards different incentive design (in terms of their purchase and referral behaviors) could indirectly reflect their consideration in organic sharing with friends and lead to advances in our understanding about the motives underlying social sharing in a rich business context with a large network of friends and a wide range of product offering. Understanding the motives of sharing is crucial in the literature of online WOM and referrals (Hong et al. 2017, Jung et al. 2018, Berger and Milkman 2012) and could potentially help explain the effectiveness of online WOM (e.g. Yin et al. 2014, 2016).

From a practical perspective, our study suggests a new direct intervention (shareable incentive design) for firms to increase the customer conversions by leveraging social sharing among themselves. Although the sharing of a product indicates the purchase intention of potential customers, most of such 'shares' do not necessarily lead to successful conversions for neither the senders nor recipients involved in the share (Cespedes 2015). With the large amount of data available on social sharing, and the technological ability to target social sharers in real time, firms are now, for the first time, equipped to monetize sharing traffic, viz., converting senders and recipients in the shares into purchases. The opportunity size in converting the sharing traffic is immense. For instance, in our study context, the number of sharers exceeds millions per year on the platform but fewer than 6% of them purchase the shared product. Any increase in the conversion rate of social sharing traffic would translate to significant growth in the platform's revenue and profit. The majority of these prior studies have focused on firms' role in *encouraging and moderating* online social sharing (e.g., Godes et al. 2005, Ryu and Feick 2007) and overlooked the ability of firms to directly *target and convert* the users engage in social sharing. Our study is aiming to fill this gap.

We conducted a large-scale randomized field experiment and a series of lab experiments to identify the causal effect of various incentive designs in engaging senders in making both purchase and further referrals. In particular, in the field experiment (Study 1), we explore the optimal design of financial incentives that vary in *shareability* and *quantity* with an eye toward their effects on the purchase behaviors of both senders and recipients involved in the social shares. The subjects in our field experiment are users who have shared a deal (senders) but are yet to make a purchase the following day. We randomly assign these senders to one of the five experimental groups characterized by different promotion incentives, and then evaluate the purchases of social sharing senders as well as their further referrals. The control group receives a simple reminder email, the first treatment group receives a reminder email containing *one single-use* and *non-shareable* promo code usable by the sender, the second treatment group receives a reminder email offering

one *single-use* and *shareable* promo code that can be used either by the sender or shared with a recipient, the third treatment group receives a reminder email including two single-use promo codes, *one non-shareable* and *the other shareable*, and the hold-out group has no treatments.

We find evidence that the incentive designs have significant impacts on the purchase likelihood of the senders and the senders' successful referrals, but in different ways. First, the treatment with one non-shareable promo code to a sender significantly increases the sender's probability of purchasing the shared deal, indicating that a non-shareable financial incentive can effectively stimulate the sender's purchase in social sharing. Interestingly, simply varying the shareability of the promo code has a significant impact on the outcomes. We find that the treatment with one shareable promo code to a sender leads to a significant increase in the recipient's but at a small cost of sender's own likelihood of purchase. This interesting finding suggests that, when the promo code becomes shareable, a subset of sender is activated to become an influencer for the firm and refer her friend to purchase the deal using the shareable promo code (some even sacrificing their own benefits). An established stream of literature in psychology and economics has found consistent evidence in other context that people care not only about their own material payoff but also about others' welfare, such as altruism, or warm glow (Khalil 2004; Wasko and Faraj 2005; Leider et al. 2009; Andreoni and Miller 2002). Finally, the two promo code treatment does not lead to any significant increase in sender's purchase and referrals. In summary, the effects of incentive designs (either one non-shareable code or one shareable code) are not only statistically significant but also economically meaningful. Given the large volume of social shares on the partner platform, the estimated increase in profits from such intervention adds up to hundreds and thousands of dollars per year. It is notable that the partner platform of our field experiment has immediately adopted the shareable promo code design after our study.

We further theorize and test the mechanisms underlying the effect of sharing incentive design on senders' purchases and further referrals, respectively, using two carefully designed lab experiments on Amazon Mechanical Turk (MTurk). The first lab experiment (Study 2) replicates the field experiment findings on the effect of three incentive designs on sender's purchase, and further measures senders' perception on those incentive designs. Drawing on previous literature, we explore plausible explanations. We propose that increasing either the shareability or the quantity (lack of scarcity) of the promo codes in the incentive design may negatively affect sender's perception of exclusivity: the senders who receive the promotion may feel the incentive is not specifically designed for them. Thus, compared to the one non-shareable code, senders are less likely to purchase the shared deal when receiving one shareable code or two codes. And such a difference in treatment effect should be mediated by senders' exclusivity perception. In the second lab experiment (Study 3), we replicate the main findings in the field experiment on sender's successful referrals (i.e., one shareable code performs better than two codes), and further theorize that one shareable code design, as compared to that of two codes, are more likely to trigger altruism motive underlying sharing thus would lead to more successful referrals by the senders. Specifically, senders are more likely to share the promo code with closer friends when they believe that their sharing behavior would create a positive social image to the recipients. Based on the theorization, we measure the senders' perceived altruism under various incentive design (one shareable code *vs.* two codes). We find that perceived altruism is higher under one code design and the senders reported that they have sacrificed their own benefits for the friend they give the promo code to. The enhanced altruism feeling leads to a higher likelihood of sharing codes with closer friends, which mediates the positive effect of incentive design on sender's referrals. In summary, the two lab experiments further corroborate the main findings in the field experiment and help uncover the mechanisms underlying the effect of incentive design on senders' purchase and further successful referrals.

Literature Review and Contributions

Our study makes several important contributions to academic research. To begin with, we contribute to the IS literature on Internet-facilitated social sharing and the design of online social sharing systems. While prior literature revolves around the idea that the consumers' social influence in social sharing could lead to purchases (Aral and Walker 2011; Jing and Xie 2011; Bapna and Umyarov 2015; Godinho de Matos et al. 2018; Hong et al. 2017), our study makes a pioneering effort to understand how firms can design interventions to accommodate customers' potential role as a 'social sharer', as well as the relative effectiveness and tradeoffs of different incentive designs in driving customers' purchase and referrals. As incentive design and social interactions are both integral components of IT artifact design (Ba et al. 2001; Hevner et al. 2004; Hong et al. 2017), our study bears a particular importance to considering social sharing as a significant IS problem.

Our study also contributes to the literature on targeted promotions (Sahni et al. 2014; Fong et al. 2016), by offering novel insights on the optimal design of targeting strategy for social sharing customers. Prior research has mostly focused on targeting customers in website and online search traffic (Ghose and Yang 2009; Goldfarb and Tucker 2011). Sharing traffic is similar to website and online search traffic to the extent that such sharing is reflective of the sender's own interest in the shared product (Luo and Zhang 2014). However, sharing behavior also fundamentally differs from online browsing and search behavior in two key aspects – first, a share could indicate the interest of the recipient, or the group (i.e., the sender as well as the recipient); second, a share reveals the sender's strong willingness to share information with friends. Those two unique features indicate that firms should design their targeting strategy *differently* for sharing traffic. Specifically, firms can target the sender with novel incentives not only to improve her own adoption, but also to leverage her to influence and engage others. In this way our study extends the literature.

From a practical perspective, the results of our study highlight how firms can leverage the underlying motives of social sharing senders to monetize sharing traffic by providing incentives. This study provides evidence for the multifaceted role of sharer motives in driving social sharing, by contrasting a series of incentive designs that speaks to different motivation of social sharing senders. Specifically, the act of sharing could reflect a sender's self-regarding motive (i.e., sender's interest in the product), other-regarding motive (i.e., sender's interest in the recipient), or group-regarding motive (i.e., sender's interest in purchasing the product with the recipient) (List 2007, Chen and Li 2009). Such sharing motives can be inferred based on sender and recipient's purchase histories. In the case of a self-regarding motive, providing direct incentives for the senders can be effective in stimulating purchases. Additionally, if the sender's sharing is driven by other-regarding motive, then the sender is less likely to respond to the one non-shareable promo code but is more likely to respond to the one shareable promo code by spreading the influence to the recipients. Under such circumstances, the firm could also benefit from providing incentives to the recipients. Finally, in the case of social events where senders and recipients are likely to benefit from joint consumption, the firm should provide incentives for both the sender and recipient to promote joint purchases. The findings not only provide immediate managerial implications to firms' practice, but also help improve our theoretical understandings on social sharing phenomenon, especially the underlying motives that drive online sharing behaviors.

Hypotheses

We propose a set of testable hypotheses that guide our incentive designs in the field experiment. Our hypotheses reflect on prior research related to the underlying motives of social sharing behaviors, namely, self-regarding motive and other-regarding motive (e.g., List 2007; Chen and Li 2009) and also build on previous literature on the promotions (e.g., Sahni et al. 2014; Fong et al. 2016).

Prior work has suggested that targeted promotions, such as product recommendations based on consumer preferences revealed in previous purchases, can effectively increase consumers' direct responses to promotions (Ansari and Mela 2003; Fleder and Hosanagar 2009). Extending past research that mostly focused on customers in website traffic or online search traffic (Ghose and Yang 2009; Goldfarb and Tucker 2011), our study considers the targeting of sharing traffic, an unexplored aspect in the prior literature. Customers in sharing traffic, similar to those in search and online website traffic, also exhibit valuable purchase interests that are useful for targeting (Lambert and Tucker 2013). However, while website and search traffic only concern the focal customers, sharing traffic involves the sender, the recipient and the sender and recipient duo. In particular, a sharing behavior could indicate the purchase interests of the social sharing sender, the recipient, or the group (i.e., the sender and the recipient). Thus, firms should look beyond the focal customer (i.e., the sender) and take into account the purchase decision of her social connections when designing the targeting strategy. Our hypotheses reflect such an idea, targeting the sharing traffic with novel incentives that consider the sender's interests, the recipient's interests as well as the sender-recipient duo's common interests.

In our study context, self-regarding motive represents the senders' own interests in the shared deal. The consumers who have shared the deal had at least viewed the deal and shown purchase interests (Luo and Zhang 2014; Li and Wu 2017). Additionally, the senders might be at the latter stages of the conversion funnel, who are interested in the deal but still need an additional nudge (e.g., in the form of an incentive) to move towards purchase (Moriguchi et al. 2016). In line with traditional economic theory that considers individuals being rational and utility-driven (Simon 1955; Simon 1981), ample research has documented

the effectiveness of financial incentives in motivating desired behaviors, from performing social shares (Huang et al. 2018), contributing online content (Burtch et al. 2017), to making purchases (Jedidi et al. 1999; Ozpolat et al. 2013). Furthermore, monetary incentives, such as promo codes for price discount, provide consumers with not only utilitarian benefits (e.g., savings, higher value) but also hedonic benefits (e.g., opportunities for exploration) (Chandon et al. 2000). Integrating the argument above, we expect that, in the social sharing setting, the potential benefits of financial incentives like a non-shareable promo code are likely to activate the senders' self-regarding motive and stimulate purchase behavior of the sender. Therefore, we hypothesize that:

H1a: The incentive design with one non-shareable promo code will increases social sharing senders' purchase likelihood, as compared to the reminder.

In addition, previous literature has documented the importance of exclusivity of incentives or product offering in driving a customer's purchase decision (Baron and Roy 2010, Dreze and Nunes 2009, Chandon, Wansink, and Laurent 2000). Consumer values reflect the exclusivity of coupons, in addition to their monetary savings (Chandon, Wansink, and Laurent 2000). Consumers tend to view exclusivity positively (Dreze and Nunes 2009), and some empirical evidence suggests that exclusive offers lead to higher redemption or conversion rates (Feinberg, Krishna, and Zhang 2002). Increasing either the shareability or the quantity of the promo codes in the incentive may negatively affect the perception of exclusivity: the senders who receive the promotion may feel the incentive is not designed for them. The lack of feeling special may decrease their likelihood of further engaging with the product. Thus, we may expect that the effect of one non-shareable promo code may be larger than those from the other two incentive design:

H1b: The effect of one non-shareable promo code on the senders' purchase likelihood is larger than the effect of one shareable code.

H1c: The effect of one non-shareable promo code on the senders' purchase likelihood is larger than the effect of two promo codes (one non-shareable and the other shareable).

Other-regarding (a.k.a. altruistic) motive reflects the sender's interest in the recipient. Extensive literature in social psychology and behavioral economics has shown that other-regarding motive is a crucial element of human nature, and people care about the welfare of others (Krebs 1970; Fehr and Fischbacher 2003). When activated, other-regarding motive may lead to pro-social behaviors with other-regarding motives (Kornish and Li 2010). As "nonreciprocal pro-social behavior," social sharing can be motivated by other-regarding motive that is intended as a courtesy or kindness to others (Benkler 2004). However, prior lab experiments (List 2007; Kahneman et.al. 1986) and observational studies (Lactera et.al. 2011) have also revealed the tension between self-regarding motives and other-regarding motives in individual decision making. Previous work show that individuals care not only about their own material payoff but also other's welfare, at least to some extent (Hoffman 1996; Andreoni and Miller 2002). Our study applies the idea of other-regarding motive to the setting of deal sharing. Specifically, we attempt to leverage the altruistic motive of social sharing senders by providing them with shareable incentives.

When a social sharing sender receives a shareable incentive (i.e., a single-use shareable promo code), her other-regarding motive is likely activated because the shareable promo code provides her an additional opportunity to benefit her friend. In this scenario, the sender might act not only just as a purchaser, but also an influencer by passing on the shareable promo code to a friend (Manchanda et al. 2008). Nonetheless, since the shareable promo code is single use, viz., can only be used once, this shareable incentive design essentially creates a tension in sender's decision-making process. The sender needs to choose between keeping the code for herself or sharing it with her friend. This could potentially lead to an interesting tradeoff between the sender's own purchase and the purchase of the social sharing recipient. As compared to a non-shareable code which is likely to increase the sender's own purchase, the shareability of the promo code is more likely to activate the sender's other regarding motive, and we would expect this to lead to an increase in the likelihood of the recipients' purchase (but may attenuate the sender's own purchase). Formally, we hypothesize the following:

H2a: The incentive design with one shareable promo code will increase the probability of a social sharing sender's successful referral than the incentive design with one non-sharable promo code.

Furthermore, prior research has found that there exists a positive reinforcement between people's altruistic action and their perceived social image (Andreoni 1989, Ariely et al. 2009, Benabou and Tirole, 2006,

Andreoni and Bernheim 2009). Such social image may be determined by how others would view the sender's sharing action, as well as the sender's own perception of her/his sharing behavior ('warm glow') (Lacetera and Macis 2010, Andreoni 1990). As a result, considering the altruistic motive, individuals are more likely to engage in a social share when they believe that their sharing behavior would create a positive social image to the recipients, or is perceived as more desirable by themselves. The design of the incentive would influence the such perceived social image. Specifically, under the condition of one shareable code, the sender need to sacrifice her/his own benefits when sharing with others. Such tradeoff does not exist under the incentive involving two promo codes. Thus, from the sender perspective, the action of sharing (the incentive) may be perceived as more altruistic by both the recipients as well as herself/himself (Ariely et al. 2009). In addition, the additional altruism and social image may drive the senders to share with closer friends, for whom they care more. Thus, if senders' other-regarding motive was in play, we would expect that under one promo code incentive, the sender is more likely to share, and will share the deal with close contacts, resulting in an increased purchase likelihood by the recipient (Kornish and Li 2010). In addition, because of the closer relationship, the sender will be more confident about the recipient's interest there reinforce the impact of the shareable incentive on the recipient's purchase. Thus, we hypothesize that:

H2b: The effect of one shareable promo code on the recipients' purchase likelihood is larger than the effect of two promo codes (one non-shareable and the other shareable).

To summarize, each hypothesis and its corresponding incentive design aims speaking to a distinctive social sharing motive. This enables us to examine the different social sharing motives under a comprehensive framework and to quantify the comparative effects of the different incentive designs within a coherent framework. To test these hypotheses, we conducted three studies employing randomized experimentation in both field and laboratory settings. In study 1, we conducted a field experiment in which the incentive shareability and quantity were manipulated in the post-sharing traffic of a leading online deal platform. In study 2, we used a lab experiment on Amazon Mechanical Turk (MTurk), with which we replicated the effects of the treatments on senders' purchase in the field experiment while directly measuring and testing the potential mechanism underlying such effects. In study 3, we performed another lab experiment on MTurk that aims to explore the potential explanations on the effects of the treatments on senders' successful referral in the field experiment.

Study 1: Randomized Field Experiment

In this study, we design and implement a randomized field experiment in collaboration with a leading online deal platform (hereafter referred as our partner platform) to examine the causal impact of incentive design on users' purchasing behavior after social sharing. The partner platform offers a wide variety of limited-time deals at relatively high discount rates, from travel, events, dining to products, and has attracted a substantial customer base. Users of the platform can directly purchase a deal through the deal page or share the deal with their social connections. Social sharing can occur either before or after purchase, realized by users clicking through the prominently displayed sharing buttons. Although a considerable number of social shares are made on the partner platform every day, only a small percentage of the shares finally convert to purchases. On average, less than 6% of the social sharing senders and 3% of the social sharing recipients purchase their shared deals on the platform. Lifting the purchase likelihood for the senders and recipients in the sharing traffic would effectively translate to increased profits for the partner platform. Our field experiment aims to investigate the effectiveness of different incentive designs in monetizing the social sharing traffic.

Experimental Design

Our field experiment employs a between-subjects design. In particular, we focus on the organic social sharing senders who had shared deals with their social connections in the previous day but did not end up purchasing the shared deal themselves. We randomly assign eligible subjects into one of the five experimental groups, as presented in Table 1, and then target them with different treatments. The treatments vary by the shareability as well as the quantity of the available promo-codes. The platform observes the sender as well as the shared deal for every share through the platform and can target email promotions in real time after observing such sharing. It is notable that we deliver unique promo-code(s) for each subject in the experiment (i.e., each promo code with a different number), which enables us to accurately track the subsequent purchase behaviors at an individual level. In addition, the non-shareable

promo code is directly linked with the user ID of the sender and thus cannot be used by any other user, and the senders are informed of this in the experiment.

Table 1. Experimental Groups in the Field Experiment		
Experimental Group	Treatment	Example
Group 0	Hold-out group. No email	N/A
Group 1	Email reminder that asks the sender to purchase the deal she just shared	Thanks for sharing this great deal! Just make sure you don't miss it for yourself.
Group 2	Email reminder with *one non-shareable* 15% promo code for the sender to purchase the shared deal	Thanks for sharing this great deal! Now you can get it for an extra 15% off. Just use code *SHAREa_FAKE* at checkout.
Group 3	Email reminder with *one shareable* 15% promo code. The sender can either use it herself or pass it on to a friend.	Thanks for sharing this great deal! Now your friend (or you) can get it for an extra 15% off. Use code *SHAREa_FAKE* now or pass on the savings to someone else.
Group 4	Email reminder with two 15% promo codes, *one non-shareable and the other shareable*.	Thanks for sharing this great deal! Now, you (and your friend) can get it for an extra 15% off. Use code *SHAREa_FAKE* at checkout and share code *SHAREb_FAKE*.

Table 1. Experimental Groups in the Field Experiment

Procedure

The experiment was implemented for a period of seven weeks. Our treatments were designed as part of the partner platform's email notification systems. The treatment emails, as shown in Figure 1, were delivered to eligible subjects once a day at the same time during the experiment. Each user on the platform is eligible to receive the treatment at most once during the test period. The randomization happens after a sender's share, by which incentives in the email are completely orthogonal to the sender's sharing behavior. Thus, any difference in the sender's purchase and sharing behaviors can be directly attributed to the difference in the received incentives. After receiving the notification emails, depending on the experimental groups, the senders could take several different actions. For example, the participant might completely ignore the incentive and not make any purchase. Alternatively, the sender could use the incentive to order the deal herself. Further, the sender in the sharable code groups could pass on the incentive to another user, and then the user could use the promo code to purchase the deal. Given these possibilities, we focus on two key outcomes in the experiment: senders' purchase likelihood and senders' successful referral. The first outcome reflects the conversion of social sharing senders after treatment, and the second outcome sheds light on whether the impact of the treatment has extended beyond the targeted senders.
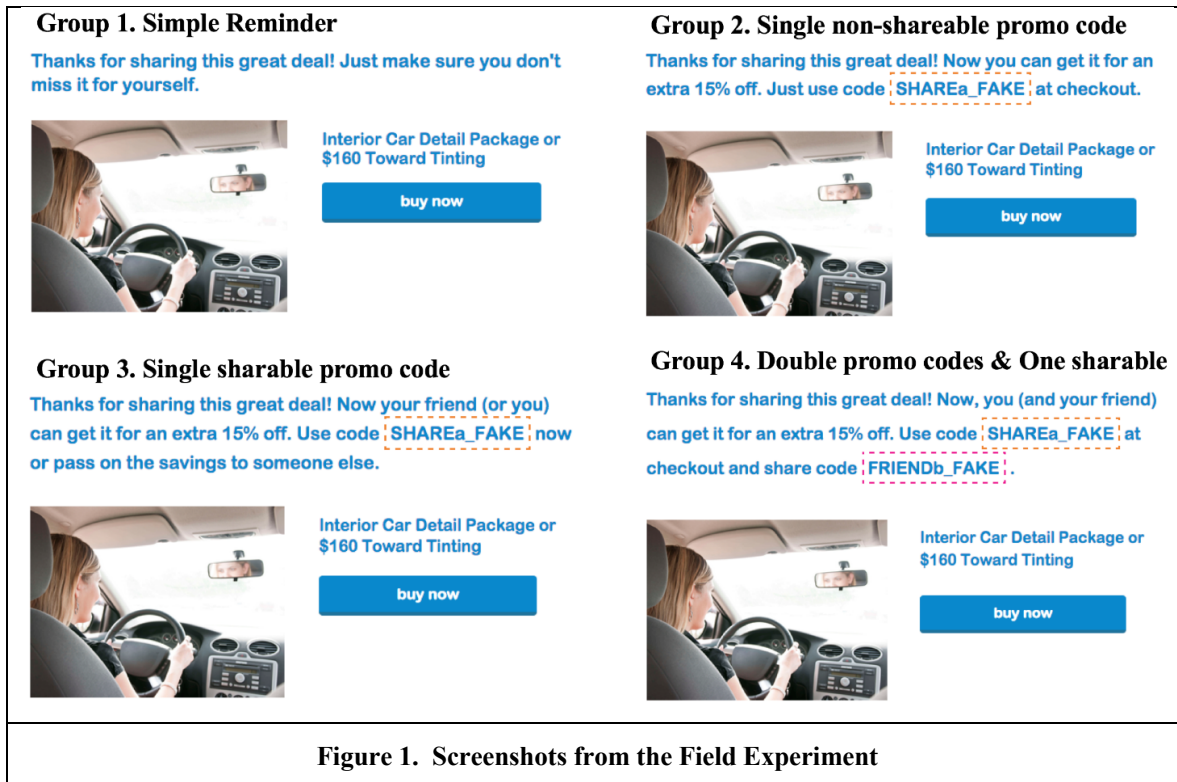
Figure 1. Screenshots from the Field Experiment

Since our experiment was conducted in a networked environment, we address any potential spillover issues in our study following the standard approach in prior literature (Aral and Walker 2012; Bapna and Umyarov 2015). To begin with, social shares in the daily deal context are highly sparse (Sun et al. 2017). Thus, given the randomized nature of our experiment, treatment spillover among senders is of less concern. One possible case of sender contamination is that a certain sender in one social share may also be the recipient in another social share. As a result, we exclude those few senders in our sample. Meanwhile, treatment spillover among recipients happens when a recipient was exposed to different treatments or the same treatment multiple times about the same product. Accordingly, we exclude the contaminated recipients who composes a very small subset of our sample. Further, in rare cases there are recipients who receive shares from different senders about multiple products. We exclude all other shares related to those recipients except for the first one, which has a negligible impact on our sample size (< 0.5% of all social shares).

We assess the validity of our randomization by conducting *t*-tests for mean comparisons across observable covariates, including sender characteristics such as number of past purchases, total past spending, user tenure, and number of past shares with the recipient, as well as deal characteristics like deal price and number of deal shares. The results of the pairwise comparisons tests show that there is no statistically significant difference between any pair of experimental groups in any aspect. The randomization check confirms that the pre-experiment purchase level for senders and the price of deals are comparable across all test groups. Further, we verify the balance with regard to deal category (i.e., a list of dummies for every major deal category in the experiment - for example, restaurant, entertainment, apparel and accessories, etc.), and find no significant difference for all deal categories. Finally, we also find a balance between control and treatments with respect to the recipient characteristics.

Data

We observe proprietary data on deal information as well as users' social shares and purchase information through the partner platform. In total, we obtain a large-size random sample that includes more than 20,000 unique senders. For every email-mediated social share, we create uniquely hashed identifiers for the sender using customer ID, the recipient using hashed email address, the shared deal through deal ID, along with the assigned experimental group key. Meanwhile, we also record data on the purchase status of the social sharing sender (for example, pre- or post-purchase share), the timestamps of share and purchase,

and the purchase status of the sender' following referral. Essentially, the constructed final dataset enables us to analyze the role of incentive design at a granular level, such as its average treatment effect on the sender's and recipient's purchases, and potential heterogeneous treatment effects based on sender, recipient, and product characteristics. The key variables in our study include sender's purchase and sender's successful referral. Sender's purchase refers to the purchase likelihood of a social share sender in the experiment (1 = purchase, 0 = no purchase), and sender's successful referral is defined as the purchase likelihood of a social share recipient in the experiment (1 = purchase, 0 = no purchase). Table 2 reports the descriptive statistics of the two outcome variables.

Table 2. Descriptive Statistics					
Variable	*Obs.*	*Mean*	*St.d.*	*Min*	*Max*
Sender's purchase	20,375	0.053	0.224	0	1
Sender's successful referral	20,375	0.029	0.167	0	1

Table 2. Descriptive Statistics

Results

We begin with reporting the bar graphs and the pairwise comparisons of group means for our outcome of interest, namely, sender's own purchase and sender's successful referral. Figure 2 presents the bar graphs of the average likelihood of purchase across experimental groups. The error bars in the graphs reflect the 95% confidence interval. We find that different incentive designs significantly influence sender's own purchase likelihood and sender's successful referral, but in distinct ways. Additionally, the mean comparisons results using two-tailed t-tests, as reported in Table 3 and 4, conform to our graphical evidence. Considering the purchase likelihood of social sharing senders, we observe a significant increase of senders' purchase likelihood in the one non-shareable promo code group ($M_{one\ non-shareable\ promo\ code}$ = .066), relative to the simple reminder group ($M_{simple\ reminder}$ = .049; t = 3.470, p = .001), the one shareable promo code group ($M_{one\ shareable\ promo\ code}$ = .056; t = 2.080, p = .038), and two promo codes group ($M_{two\ codes}$ = .054; t = 2.480, p = .013). Thus, hypothesis 1a, 1b and 1c is supported. Next, we examine outcome as to the likelihood of sender's successful referral. It appears that the senders' successful referral likelihood is significantly higher in the one shareable promo code group ($M_{one\ shareable\ promo\ code}$ = .036), compared to the simple reminder group ($M_{simple\ reminder}$ = .025; t = 2.940, p = .003), the one non-shareable promo code group ($M_{one\ non-shareable\ promo\ code}$ = .028; t = 1.990, p = .047), and the two promo codes group ($M_{two\ codes}$ = .029; t = 1.880, p = .060). Thus, hypothesis 2a and 2b are confirmed.

We further perform estimations on the average treatment effects using regressions, which could produce the estimates with higher efficiency than pairwise t-tests (Duflo et al. 2007). Since our outcome variable (i.e., purchase likelihood) is binary in nature, we employed both a linear probability model (LPM) and a logistic regression, with one being a robustness check to the other. Our results from the regressions are perfectly consistent with the above tests in Table 3 and 4, and further confirm the hypothesis.
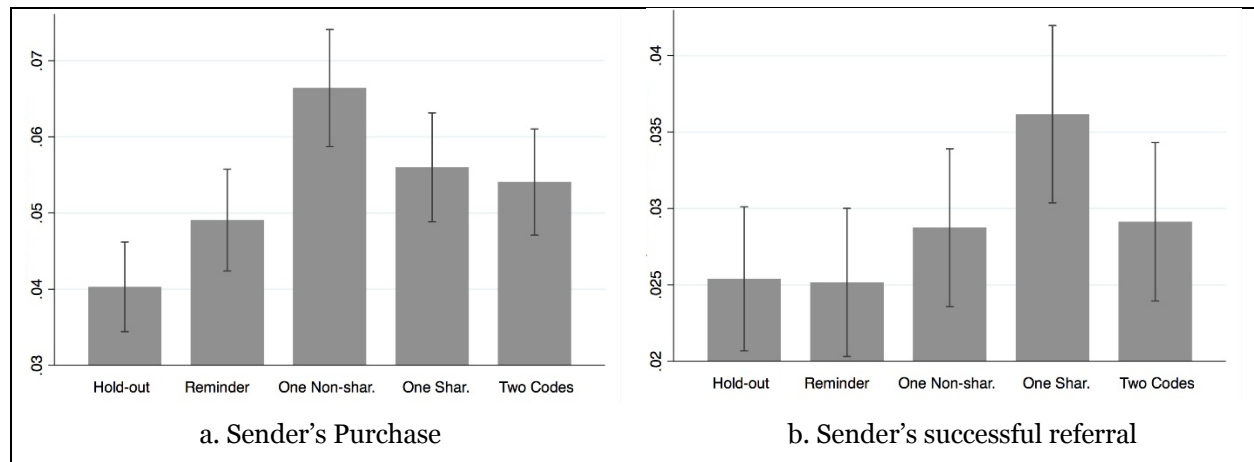

a. Sender's Purchase   b. Sender's successful referral

Figure 2. Purchase Likelihood by Group in the Field Experiment

Table 3. Mean Comparisons by Group in Sender's Purchase				
Two-sample t-Tests	*Mean Contrast*	*Diff.*	*t*	*p-value*
Reminder *vs*. Hold-out	.049 *vs*. .040	0.009	1.780	0.074
One non-shar. *vs*. Hold-out	.066 *vs*. .040	0.026	5.320	0.000
One shar. *vs*. Hold-out	.056 *vs*. .040	0.016	3.190	0.001
Two codes *vs*. Hold-out	.054 *vs*. .040	0.014	2.800	0.005
One non-shar. *vs*. Reminder	**.066 *vs*. .049**	**0.017**	**3.470**	**0.001**
One shar. *vs*. Reminder	.056 *vs*. .049	0.007	1.380	0.167
Two codes *vs*. Reminder	.054 *vs*. .049	0.005	1.000	0.318
One shar. *vs*. One non-shar.	**.056 *vs*. .066**	**-0.010**	**-2.080**	**0.038**
Two codes *vs*. One non-shar.	**.054 *vs*. .066**	**-0.012**	**-2.480**	**0.013**
Two codes *vs*. One shar.	.054 *vs*. .056	-0.002	-0.390	0.698

Table 3. Mean Comparisons by Groups in Sender's Purchase

Table 4. Mean Comparisons by Groups in Sender's Successful Referral				
Reminder *vs*. Hold-out	.025 *vs*. .025	0.000	-0.060	0.949
One non-shar. *vs*. Hold-out	.028 *vs*. .025	0.003	0.910	0.362
One shar. *vs*. Hold-out	.036 *vs*. .025	0.011	2.920	0.003
Two codes *vs*. Hold-out	.029 *vs*. .025	0.004	1.020	0.309
One non-shar. *vs*. Reminder	.028 *vs*. .025	0.004	0.960	0.337
One shar. *vs*. Reminder	**.036 *vs*. .025**	**0.011**	**2.940**	**0.003**
Two codes *vs*. Reminder	.029 *vs*. .025	0.004	1.060	0.287
One shar. *vs*. One non-shar.	**.036 *vs*. .028**	**0.007**	**1.990**	**0.047**
Two codes *vs*. One non-shar.	.029 *vs*. .028	0.000	0.100	0.917
Two codes *vs*. One shar.	**.029 *vs*. .036**	**-0.007**	**-1.880**	**0.060**
Reminder *vs*. Hold-out	.025 *vs*. .025	0.000	-0.060	0.949

Table 4. Mean Comparisons by Group in Sender's Successful Referral

Discussion

Study 1 offers several interesting insights. To begin with, the incentive design with one non-shareable promo code significantly increases the sender's probability of purchasing the shared deal as measured by the increased usage of promo codes. Further, when the one promo code becomes shareable, we observe that the incentive design with one shareable promo code leads to an increase in the sender's successful referral at the expense of the sender's own purchase. The effects of these incentive designs are not only of statistical significance but also of economic significance. Given the large volume of social shares through the partner platform, the estimated increase in revenue from such intervention accrues to hundreds and thousands of dollars per year. The principle advantage of the field experiment is study 1's ability to directly manipulate and accurately measure the effects of incentive shareability and quantity on the outcomes related to senders' purchases and their successful referrals. Although the field experiment successfully established internal and external validity, study 1 sheds limited light on the underlying mechanisms of the observed relationships. As such, we complement study 1 with the following studies 2 and 3 that aim to examine the possible mechanisms with MTurk experiments.

Study 2: MTurk Experiment
– Mediating Role of Exclusivity on Sender's Purchase

The primary goals of Study 2 were to investigate the plausible explanation underlying the main effect of the one non-shareable promo code on the senders' purchase likelihood, while also testing the robustness of our findings in the field experiment. In this MTurk experiment, we explore the idea that a promotion with one non-shareable promo code is more likely to be perceived as exclusive, compared to the promotions with either one shareable promo code or two promo codes. Using a between-subject design, study 2 manipulates the shareability and quantity of promo codes, and also directly measures the perceived exclusivity of each promotion scenario. As last, due to the limitation of lab experimentation, instead of observing the participants' real-life purchases, we measure the senders' purchase intention in study 2.

Procedure

We conducted the experiment on Amazon Mechanical Turk (MTurk). The participants were randomly assigned into the either of the three groups: the one non-shareable code group, the one shareable code group, and the two promo codes group. In order to mimic the scenario in the field experiment (i.e., Study 1), the subjects were asked to visit Groupon.com and select a deal that they hope to share to a friend. As an attention check, the participants were required to copy and paste the link of the deal page in a text response question.

After having submitted the deal link, the participants would enter into a scenario of receiving post-sharing promotion, which varies by the experimental groups. As a manipulation check, the participants were asked to point out the shareability and quantity of promo codes in that promotion scenario. Upon completing the manipulation check, the participants were then asked to report i) their perceptions of the exclusivity of the promotion, ii) their intention to share the promotion to a friend, and iii) their intention to use the promotion to buy the deal/product. Perceived exclusivity was measured on a 11-point Likert scale, using three items adapted from (Barone and Roy 2009). We measure the purchasing and sharing intentions, each separately, on a single-item 11-point scale, consistent with Wilcox et al. (2009). At the end of the experiment, we implanted a screener question using the instructional manipulation check (IMC; Oppenheimer et al. 2009) that aims to screen out the inattentive respondents.

Results

We obtained the effective responses from 107 workers who had passed the manipulation and the attention checks in the questionnaire. The demographic measures indicate that the participants have an average age of 34.85 with a gender composition of 35 females and 72 males. Around 74.77% of the participants have a bachelor's degree or higher; around 72.90% of the participants report a household income of 30,000 or higher; and around 98.13% of the workers shop monthly online or more frequently.

Before further analysis, we examined the reliability and validity of exclusivity measurement. Cronbach's alpha for perceived exclusivity items was 0.96, suggesting adequate internal reliability for the exclusivity construct (Rosenthal and Rosnow 1991). In addition, we conducted an exploratory factor analysis (EFA) to assess the convergent and discriminant validity of the exclusivity construct (Härdle and Simar 2007). The EFA result with varimax-rotation suggests that the items belong to one factor with loading being greater than 0.92 on each item. Further test on the average variance extracted (AVE) shows AVE value being great than .89, validating the convergent validity of our measurement items (Fornell and Larcker 198).

Our first important question concerned whether subjects' purchase intention and the perceived promotion exclusivity vary across the experimental groups. The patterns of the means for both constructs are illustrated in Figure 2. Further *t*-tests of suggest that the participants perceive the promotion with one non-shareable code to be significantly more exclusive than the promotions with either one-shareable code ($M_{\text{one non-shareable promo code}}$ = 7.757 *vs.* $M_{\text{one shareable promo code}}$ = 6.545; t = 2.50, p = .014) or two codes ($M_{\text{two codes}}$ = 6.541; t = 2.58, p = .011). Meanwhile, the participants reported significantly higher purchase intention in the promotion scenario with one non-shareable code than those in the promotion scenarios with either one-shareable code ($M_{\text{one non-shareable promo code}}$ = 6.784 *vs.* $M_{\text{one shareable promo code}}$ = 4.081; t = 4.13, p < .001) or two codes ($M_{\text{two codes}}$ = 3.360; t = 5.38, p < .001).

a. Sender's purchase intention   b. Perceived incentive exclusivity
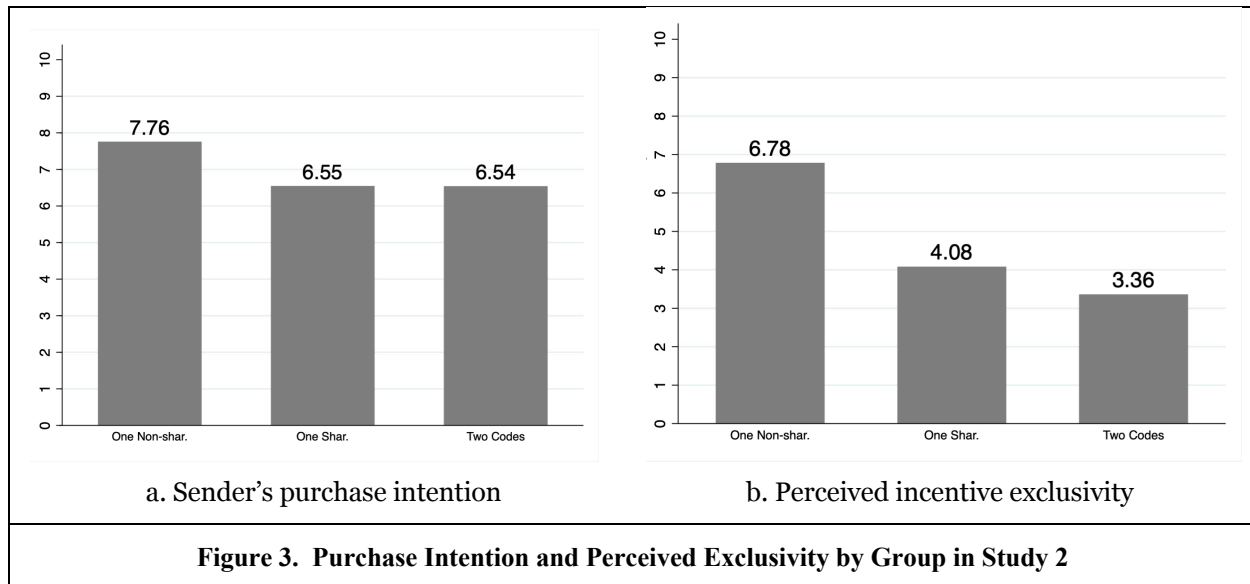
Figure 3. Purchase Intention and Perceived Exclusivity by Group in Study 2

To further investigate the role of perceived exclusivity in the relationship between the experimental groups and purchase intention, we performed the Sobel-Goodman mediation tests, using a bias-corrected bootstrapping procedure. Specifically, we used the bootstrap command in tandem with the sgmediation package in Stata, employing exclusivity as the mediator. Considering the fact that the experimental group vary by two key constructs, namely incentive shareability (i.e., one non-shareable *vs.* one shareable code) and quantity (i.e., one non-shareable code *vs.* two codes). We conducted a set of two mediation analyses, with the dependent variable being the purchase intention and the independent variables being shareability and quantity separately. The results of the mediation analyses are reported in Table 5.

Table 5. Mediation Analyses in Study 2			
Biased corrected indirect effect on purchase intention through promotion exclusivity			
	Estimate	Bootstrap S.E.	Bootstrap Confidence Interval
Shareability	−1.200	.334	[−2.009, −.657]
Quantity	−.977	.284	[−1.713, −.522]

Table 5. Mediation Analyses in Study 2

In the first set of the mediation analysis, the indirect effect of incentive shareability on purchase intention, through exclusivity, yielded a 95% confidence interval that did not contain zero (95% CI = [−2.009, −.657]). Meanwhile, in the second set of the mediation analysis, the indirect effect of incentive quantity on purchase intention, through exclusivity, yielded a 95% confidence interval that did not contain zero (95% CI = [−1.713, −.522]). These results indicate that perceived exclusivity indeed mediates the effects from the incentive shareability and quantity to purchase intention. Therefore, we conclude that perceive exclusivity could be a candidate underlying mechanism that drives the effects of one non-shareable promo code on sender's purchase intention in the study 2 and the sender's real purchase in the field experiment.

Discussion

The primary purpose of Study 2 were to explore the plausible explanation on the main effect of the one non-shareable promo code on the senders' purchase likelihood, while also replicating the main findings in the field experiment. By directly measuring the perceived exclusivity, Study 2 provided direct evidence for perceived exclusivity being a plausible mechanism underlying the main effect between one non-shareable promo code and senders' purchase intention.

Study 3: MTurk Experiment
– Mediating Role of Social Motives on Sender's Successful Referral

The primary goal of study 3 was to investigate the plausible explanation on the main effect of the incentive scarcity (i.e., one shareable promo code *vs.* two promo codes) on the probability of senders' successful referrals, while also examining the robustness of our findings in the field experiment. Guided by the logical considerations in the hypothesis development, we explore the idea of social motives that include perceived altruism and social image (Andreoni 1990; Ariely et al. 2009). Prior literature suggests that there exists a reinforcing relationship between individuals' altruistic action and their interests in building a social image (Benabou and Tirole 2006; Andreoni and Bernheim 2009). Therefore, in study 3, we consider that the senders might experience a greater sense of altruism and a higher tendency to build social image when sharing the only one promo code compared to two promo codes. It is possible that the sender's social motives would play a significant role in the probability of successful referral.
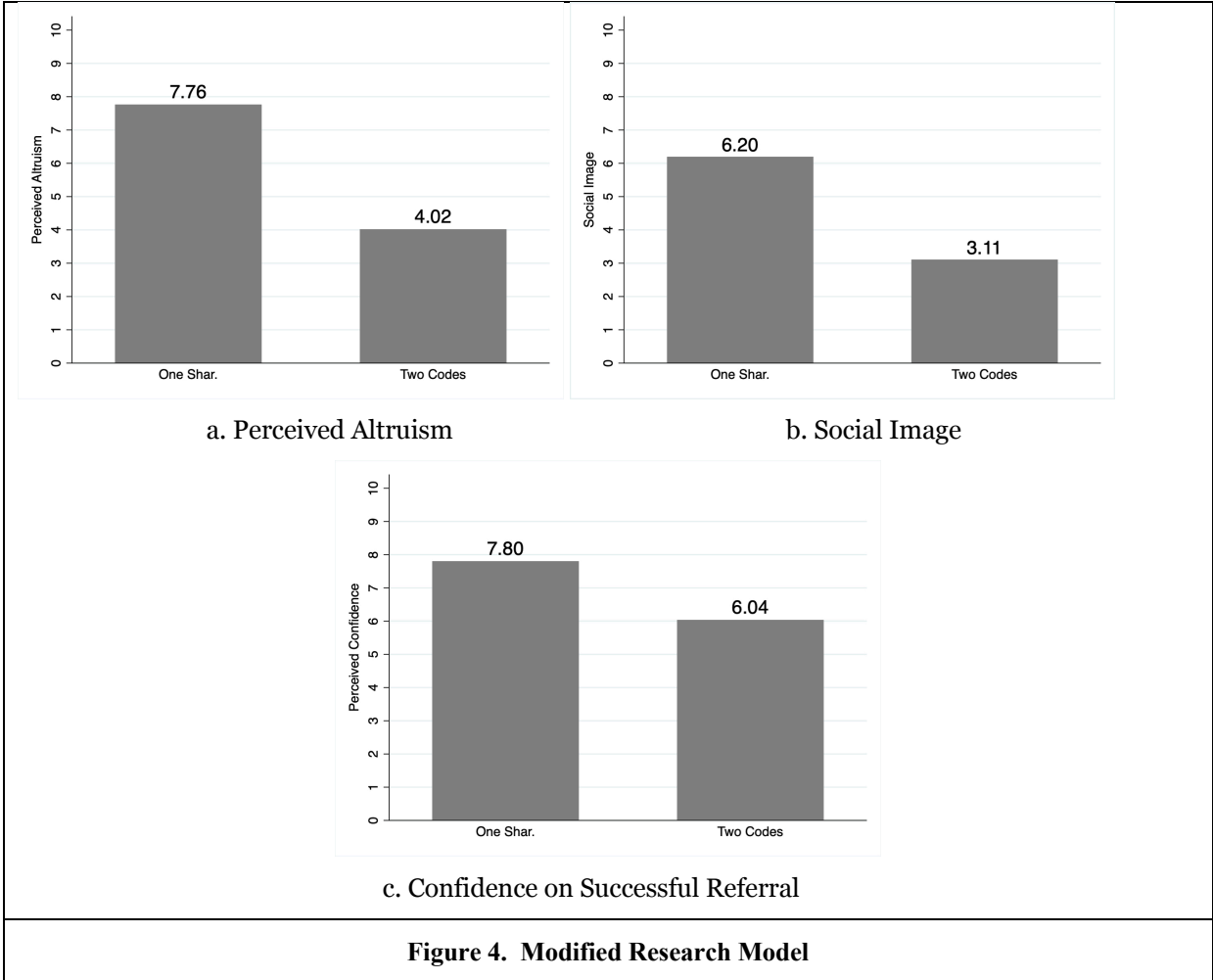
Procedure

Study 3 was conducted on Amazon Mechanical Turk (MTurk). Considering that the one non-shareable promo code does not support further referral, study 3 mainly compares two experimental groups: the one shareable promo code group and the two promo codes group. In study 3, we also used a between-subjects design and randomly assigned participants to either of the two experimental groups. Following study 2 that mimics the scenario in the field experiment, the subjects were asked to visit a deal page on Groupon.com that they hope to share with a friend. As an attention check, the participants were required to input the name and the link of the deal and then walked in a scenario of receiving post-sharing promotion and complete a manipulation check on the scenario accordingly. We then asked the participants to report i) their social sharing tendency, ii) social motives behind sharing, and iii) the name of the friend intended to share the incentive to as well as their confidence that the friend would use the shared incentive. We measured the social motives, namely, perceived altruism and social image, with two items on an 11-point Likert scale adapted from Ryu and Feick (2007). Consistent with study 2, we measure the sharing intentions on a single-item 11-point Likert scale (Wilcox et al. 2009). Similarly, the perceived confidence was also measured on an 11-point Likert scale. At the end of the experiment, we asked the participants about the perceived realism of the scenario (Morales et al. 2017) and also employed a screener question using the instructional manipulation check (IMC, Oppenheimer et al. 2009) that aims to screen out the inattentive respondents.

Results

We obtained the effective responses from 106 workers who had passed the manipulation and the attention checks in the questionnaire. The demographic measures indicate that the participants have an average age of 35.58 with a gender composition of 33 female and 73 male participants. Around 66.04% of the participants have a bachelor's degree or higher; around 70.75% of the participants report a household income of 30,000 or higher; and around 96.23% of the workers shop monthly online or more frequently. Finally, the participants report an average of 4.57 out of 5.0 in perceived scenario realism, validating the realistic design of study 3.

Our first question concerns whether subjects' social motives vary across the experimental groups. The results in study 3 show that the participants in the one shareable promo code group report significantly higher perceived altruism ($M_{one-shareable\ code}$ = 7.76 *vs.* $M_{two\ codes}$ = 4.02, p < .01) and greater intention to convey their altruistic social image ($M_{one-shareable\ code}$ = 6.20 *vs.* $M_{two\ codes}$ = 3.11, p < .01) than those in the two promo codes group. These findings suggest that the senders show greater social motives with one promo code *vs.* two codes. Next, we examine the senders' perceived confidence of successful referral. Our results show that the participants in the one shareable promo code group report stronger confidence that their friend would use the incentive to buy the deal ($M_{one-shareable\ code}$ = 7.80 *vs.* $M_{two\ codes}$ = 6.04, p < .01). The patterns of the constructs are illustrated in Figure 4.

a. Perceived Altruism   b. Social Image

c. Confidence on Successful Referral

Figure 4. Modified Research Model

To further investigate the role of social motives in the relationship between the incentive scarcity and successful referral, we performed the mediation tests, using a bias-corrected bootstrapping procedure.[1] Specifically, we used the bootstrap command in tandem with the *sureg* command in Stata, employing perceived altruism and social image as the mediators. We conducted the mediation analysis with the dependent variable being the perceived confidence and the independent variable being incentive scarcity. The results of the mediation analyses are reported in Table 6. In the mediation analysis, the indirect effect of incentive scarcity on referral confidence, through perceived altruism, yielded a 95% confidence interval that did not contain zero (95% CI = [−2.472, −.099]). Meanwhile, the indirect effect of incentive scarcity on referral confidence, through social image, yielded a 95% confidence interval that did not contain zero (95% CI = [−1.324, −.021]). These results indicate that perceived altruism and social image indeed mediates the effects from the incentive scarcity to sender's confidence on successful referral. Therefore, we conclude that social motives could be a candidate underlying mechanism that drives the effects of one shareable promo code (*vs.* two codes) on a sender's successful referral in the field experiment.

Table 6. Mediation Analyses in Study 3		
Biased corrected indirect effect on confidence of successful referral		
	Estimate	Bootstrap S.E.	Bootstrap Confidence Interval

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[1] Again, our approach is similar to the bootstrap test proposed by Preacher and Hayes (2008).

| Perceived altruism | −1.187 | .617 | [−2.472, −.099] |
| Social image | −.537 | .332 | [−1.324, −.021] |

Table 6. Mediation Analyses in Study 3

Discussion

The principle advantage of study 3 is the ability to directly measure and test the potential roles of the perceived altruism and social image in a straightforward manner. The results of this study are compatible with our theoretical framework, which assumes that consumer derives utility from sharing an incentive with a friend. This study also shows consistent evidence with the field experiment on the likelihood of successful referral with one shareable promo code. Therefore, study 3 supplemented the first two studies by providing direct evidence on the perceived altruism and social image being the plausible mechanisms underlying the main effect between incentive scarcity and senders' successful referral.

Conclusion

We report on a series of randomized experiments in both field and lab settings that demonstrated how firms can use incentive designs to effectively monetize sharing traffic in the context of online platforms. Our study highlights the importance of understanding the motives behind online sharing and shows that the effectiveness of the incentive designs critically depends on the motivations of the senders who share information with their social connections at the first place. The results of our study also suggest that firms can customize incentive designs based on the underlying motives of the senders. With the rapid advancement in firms' capabilities to process large amounts of data and to analyze real-time consumer behaviors, we envision that in the near future firms can further prefect these incentive designs and deliver them in real time in a personalized fashion. Our work serves as a valuable proof-of-concept of this impending development. Moreover, we foresee ample research opportunities to build on this line of work. It is our hope that future research can extend on our study, and further explore various moderators to shed light on the variations in the treatment effects for additional observable covariates.

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