

The Impact of Referral Coupons on Customer Behavior and Firm Revenues: Evidence from Field Experiments

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Abstract

Inspired by the phenomenal success of referral programs in services, e.g., Dropbox, retailers now offer customers referral coupons, which can be not only redeemed like regular coupons but also shared with other customers. The authors investigate whether referral coupons are more effective in generating sales than regular, non-sharable, coupons using data from three large-scale field experiments. Surprisingly, the results show that referral coupons are, on average, less effective than regular coupons in generating sales from primary recipients. The finding is robust to the type of promotions offered. The authors propose two explanations based on: (1) brand persuasion and trust and (2) cognitive cost of making referrals. They provide empirical evidence that brand persuasion is the more likely mechanism of how customers respond to referral coupons. The authors also assess the impact of targeted referral campaigns on customer behavior and firm revenues and derive recommendations for firms to implement referral campaigns.

Keywords: Referrals, Promotions, Targeting, Mobile coupons, Field experiments

INTRODUCTION

Understanding how consumers respond to coupon promotions has long been an object of theoretical and empirical research in marketing (e.g., Reibstein and Traver 1982, Narasimhan 1984, Neslin 1990, Raju, Dhar, and Morrison 1994). Firms across many industries spend a significant portion of their marketing budgets on such promotions and carefully monitor how redemptions occur. A recent trend in coupon promotions is that firms are targeting their customers with personalized marketing offers (e.g., Rossi, McCulloch, and Allenby 1996, Thomas, Reinartz, and Kumar 2004, Musalem, Bradlow, and Raju 2008, Venkatesan and Farris 2012). Such customized coupons are available only to select customers of a firm, and focus on increasing its revenues. With advances in technology, retailers have been experimenting with new forms of coupons taking inspiration from promotional campaigns in other business contexts.

The phenomenal success of referral programs, especially in Internet and technology services (e.g., Dropbox, PayPal, Airbnb) for customer acquisition, suggests that firms can use their customers proactively for informing others about their offerings. In the case of Dropbox, for instance, users could invite others via email to Dropbox, and both referrer and referee received additional free storage space. Anecdotal evidence suggests that this referral program was largely responsible for the tremendous growth in Dropbox's user base from 100,000 registered users in September 2008 to more than 4 million within the next 15 months.¹

Inspired by the success of referral campaigns, retailers have begun employing "referral" coupons (we use "campaign", "promotion", and "coupon" interchangeably) that are redeemable by customers who receive them directly from the firm (primary recipients). Furthermore, these customers can share the coupons with others (secondary recipients) who can benefit too. For

¹ <http://www.referralcandy.com/blog/referrals-built-dropbox-empire/>

instance, Wynn Casino sends promotions which include a call-to-action link for their customers to share with friends (see Figure 1). Customers can send the promotion to others by clicking “Forward this to friends” appeared at the bottom of the first image of Figure 1, where they are subsequently (the second image of Figure 1) asked to provide the contact information of their friends. Another example is the service offered by WeChat, a popular instant messaging application, called “Friends Shared Coupons” in which the coupons distributed on WeChat can be shared among friends. It is important to note that referral coupons differ from social coupons (e.g., Groupon) where there is a minimum level of participation before the offer becomes valid (e.g., Edelman, Jaffe, and Kominers 2016, Hu, Man and Winer 2016). While marketers hope that referral coupons will generate higher sales than regular, non-shareable, coupons, there is little empirical evidence of such impact.

Insert Figure 1 about here

In this research, we investigate the impact of referral coupons on customer behavior and firm revenues. We conducted three large-scale field experiments in collaboration with a global beauty company. In the main study, customers were randomly assigned to one of two groups: (1) a group that received the price discount coupon that they could use only for themselves (the regular coupon group) and (2) a group that received the price discount coupon that they could use for themselves and in addition could share with their friends (the referral coupon group). Note that in the referral coupon condition of the field test, there was no sequence imposed for purchasing and sharing. Customers could purchase without sharing or share without purchasing. At first glance, referral coupons should generate higher revenues for the firm compared to regular coupons targeted to similar customers. This is because both coupons can be redeemed by

primary recipients, while the referral coupon allows for additional redemption from secondary recipients, who receive the coupon from their friends.

While a firm may wish to leverage their customers to increase awareness of the promotion, primary recipients may find the task of making referrals onerous. For example, they have to determine which of their contacts will find the coupon useful, which requires them to take the perspective of their friends and consider who might actually want such a coupon (e.g., Barasch and Berger 2014). There might also be reputational concerns (e.g., Folkes 1984, Gatignon and Robertson 1986). Such costs associated with referral coupons (as compared to regular coupons) may cast a negative light on the entire communication itself (e.g., Cheema and Soman 2008). Another reason for a less favorable perception of the communication can stem from consumers not trusting the firm and inferring that it has an ulterior motive for sending the coupon (e.g., Campbell and Kirmani 2000, Freistad and Wright 1994, 1995). Any suspicion of the underlying motives can lead to unfavorable view of the agent and the offer (e.g., Fein, Hilton and Miller 1990).

Our results indicate that exposing customers to referral coupons can decrease their propensity to purchase as compared to regular coupons. Specifically, in our main study, we compare purchase rates across conditions and find that, whereas 9.05% of primary recipients in the regular coupon group purchased during the campaign, only 7.22% did so in the referral coupon group ($p = .002$). Moreover, the lowered propensity to purchase in the referral coupon condition leads to a lower average revenue from primary recipients (i.e., their “self-value”) as compared to that in the regular coupon condition. When we add the revenues originating from all secondary recipients corresponding to a primary recipient (i.e., the recipient’s “social-value”) to her self-value, we find that the group with referral coupons, on average, fails to generate higher

revenues as compared to that with regular coupons. Our key result regarding the decrease in purchase propensity with referral coupons is robust to the type of promotion. While the main study involves a price reduction coupon, we replicate the findings with a second field study with free sample promotions.

We propose two explanations for the decrease in purchase propensity with referral coupons based on affect or commitment to the firm (e.g., Folkes 1984). The first explanation is based on trust and brand persuasion. Customers may not trust the firm and infer that it has ulterior motives for sending referral coupon—it is clearly trying to persuade them to purchase but is also using their social connections to spread awareness of the campaign. Such suspicion of underlying motives can cast a negative light on the communication itself. The second explanation is related to the cost of making referrals. Referrals are cognitively taxing as customers have to consider who among their friends will like the coupon and what reputational signals are conveyed to these friends when they share the coupon with them. While the referral coupon did not explicitly ask customers to refer in order to redeem, consumers may not want to engage in any activity at all after being exposed to the campaign with a high cognitive cost. Both mechanisms may be at work, but additional analysis based on a third field experiment suggests that trust and brand persuasion is the more likely explanation for how consumers respond to referral coupons.

Drawing on these findings, we discuss conditions under which firms should run referral campaigns. We also assess the potential impact of referral coupons on firm revenues if it were to run more targeted referral campaigns.

We proceed as follows. First, we describe the research setting of our main field experiment. We quantify the impact of referral coupons relative to regular coupons on their

redemption behavior and assess the revenue implications of targeting customers with referral coupons. We then show that our main finding is robust with other types of promotions using data from a second field experiment. Using a third field experiment, we provide a deeper understanding of the two proposed explanations for the key result, and discuss other alternative explanations (e.g., coupon exclusivity). We conclude with directions for future work.

RESEARCH SETTING

To assess the impact of referral coupons in promotion campaigns, we should have a research setting that ideally satisfies several conditions. First, the exposure to referral coupon (and regular coupon) must be randomized across customers. Second, one must have data on customers' purchases before the intervention. Third, one must have data on the purchases and referrals made by the customers who received the campaign communication from the firm (primary recipients). Fourth, one must have the data on the purchases made by referred customers (secondary recipients), which can also be linked to the corresponding primary recipient. The latter allows one to measure the overall impact of referral coupons on firm revenue. Finally, one must observe or control for any marketing efforts deployed.

To meet these stringent conditions, we secured the cooperation of a large global beauty company, which is a manufacturer and marketer of skincare and makeup products. The beauty industry is an attractive context for our research as firms in this industry frequently use promotional campaigns to increase their revenues, and are eager to experiment with new forms of promotions to manage customer relationships. Similar to other companies in this industry, the company was keen on understanding the impact of referral coupons to the customers, compared

to regular coupons. Managers were hopeful that these coupons would be appealing to customers and would encourage social interactions, leading to more sales than from regular coupons.

Field Experiment: Main Study

Customers: Customers who were the members of the firm's loyalty program were randomly selected as participants for the study. Such a selection is helpful as we were able to track all the purchases of individual participants both in pre-campaign and campaign periods. In addition, it enabled us to distribute coupons, whether they are regular or referral coupons, to customers as they could be contacted via their mobile phones (mobile phone numbers for customers were obtained when they became part of the firm's loyalty program). This is an important feature of the study to address potential selection bias with coupons because the coupons were automatically applied to the accounts of members when they (both primary and secondary recipients) purchased. Traditionally, customers have to clip coupons or download and print them prior to redemption—a selection bias occurs if certain types of customers are more likely to retrieve the coupon than others. Our empirical setting alleviates potential selection bias in terms of both coupon usage and missing data on non-purchase (e.g., Erdem, Keane, and Sun 1999).

All customers who had purchased from the retailer in the pre-campaign period spanning from June 2013 to June 2014 (13 months) before the intervention were eligible for inclusion in the experiment. There were no other marketing activities targeted toward these customers during the campaign itself.² Of the customers who satisfied these criteria, 8,543 were randomly selected

² During the campaign period in this randomized field experiment, there were no other activities targeted towards these customers who are the members of the firm's loyalty program. Hence, secondary recipients could obtain the coupons only through referrals made by primary recipients.

to be included in the field experiment. We randomly assigned 4,252 customers (49%) to the regular coupon group and the remaining 4,291 (51%) to the referral coupon group.

Intervention: Customers in both groups were contacted by the firm on the same day via their mobile phones in July 2014 for a campaign spanning a two week period. The campaign communication included a price discount coupon that recipients could redeem during the two-week campaign period while purchasing any product that the retailer offered. In the regular coupon condition, the coupon could only be redeemed by the customer who received the campaign communication directly from the firm. In the referral coupon condition, similar to the regular coupon condition, the primary recipient could redeem the coupon for herself. Furthermore, she could share the communication with as many other people as she wished.

Note that primary recipients in our field test were not compensated in any way (e.g., via a monetary incentive) for making referrals. While some services do compensate consumers for referrals, it is typically for new customer acquisition with recurring future transactions, which differs from the one-shot purchase decision that we consider. Additionally, there is evidence that external intervention using monetary incentives may lower the propensity of consumers to undertake tasks that are intrinsically motivating (termed as the crowding out effect). Please see Lepper and Green (1978) and Frey and Jegen (2001) for a comprehensive discussion. Since employing referral coupons is a new marketing tactic with little evidence for its effectiveness, the implementation was kept simple and no monetary incentive was offered for sharing. In the conclusions, we discuss monetary rewards for referrals as a direction of future research.

Customers in the referral coupon condition were not required to purchase in order to make referrals to their friends, and could make several referrals at any time during the campaign.

Thus, in contrast to sequential activities, which require the completion of one activity in order for a customer to engage in the other activity (e.g., Sismeiro and Bucklin 2004), purchasing and sharing were not sequential by design (e.g., Schweidel, Park, and Jamal 2014). Customers could purchase without sharing or share without purchasing. It was made clear to customers in the referral coupon group that they could use the coupon for themselves as well as share the communication with others.

The referral coupons in our randomized field experiment differ from social promotions and coupons which require some action on a social network for them to be used. The deal through Groupon, for example, becomes available to all participants if a certain number of consumers signed up for the offer. Such social promotions can allow retailers to offer distinct prices to different consumer populations (e.g., Edelman, Jaffe, and Kominers 2016). Referral coupons, on the other hand, are redeemable by customers who receive them directly from the firm. Furthermore, as primary recipients can share referral coupons with others, secondary recipients can benefit too.

Next, we describe in more detail how the campaign was implemented. The general procedure of our field experiment was similar to the example in Figure 1. But unlike the example in Figure 1 where customers need to complete the information of their friends, customers in the referral condition of our main study could share coupons with others using instant messaging applications. We selected the instant messaging service as it reduces the burden of sharing coupons with others and is popular among customers in our research context. Examples of instant messaging applications, one of the fastest growing forms of communication channels, include WhatsApp, Viber, WeChat, Line, Snapchat, and KakaoTalk in many countries worldwide. They use the Internet to send text messages, images, videos, and audio media

messages to other users around the world using standard cellular mobile numbers, all virtually instantly. Customers in the referral coupon condition could share the coupons with their friends by clicking a “share” button in the campaign communication, which was prominently displayed, selecting the names of (secondary) recipients in their instant messaging service, and clicking the “send” button.

In the main study, a primary recipient could select as many other secondary recipients as they wished in a single “send” and make as many referrals (sends) as they wished. The instant message service automatically delivered a message to each (secondary) recipient’s account separately and hence, each secondary recipient received the message as one-to-one personal message. Once a secondary recipient clicked the coupon on the communication and redeemed it, that purchase was associated with the corresponding primary recipient.³ Similar to the price discount coupon for primary recipients, secondary recipients could redeem the price discount coupon during the two-week campaign period while purchasing any product that the retailer offered. Figure 2 shows the design of the main study as well as the set of decisions the customers faced after the intervention.

Insert Figure 2 about here

Data

For the primary recipients of the coupon, we have data on the transactions with the retailer in the 13-month period before the intervention. After the intervention, we have data on whether the primary recipient redeemed the coupon, if so how much she purchased from the retailer during

³ If a secondary recipient were the member of the firm’s loyalty program or became a member at the time of her shopping, her purchases were recorded and associated with the corresponding primary recipient. If she were not a member, her purchases could not be tracked. In our research setting, the latter set of customers was rare.

the campaign, and whether she shared the coupon with others. We also have data on the secondary recipients who redeemed the coupon for purchase during the campaign. As we record the unique identifier of the referral coupon for each primary recipient, the purchases made by secondary recipients were linked with the corresponding primary recipient who was exposed to the referral coupon. Hence our data enables us to analyze the impact of referral coupons on the firm's revenue with and without the purchases made by secondary recipients.

Pre-campaign Descriptives: Table 1 describes the individual-level data over the 13-month pre-campaign period. It covers detailed purchase data for the 8,543 individual customers who were part of the randomized field experiment. We checked the face validity of the randomization between regular and referral coupon groups. There was no statistically significant relationship between whether a customer was exposed to regular or referral coupon ($p = 0.932$) and the days since most recent purchase (i.e., recency). The distribution of the recency measure is almost identical across groups. In addition, the number of products they had previously purchased ($p = 0.574$) and the number of purchases (transactions) they had previously made ($p = 0.498$) did not vary with the type of coupons they were exposed to in the campaign communication. Moreover, both the distributions of the number of products purchased and the number of purchases are almost identical between the two groups. Importantly, the amount of purchases made in the pre-campaign period also did not vary with the type of coupons received ($p = 0.894$). The distribution is almost identical across conditions. In short, there is no evidence that the randomization was ineffective.

Insert Table 1 about here

RESULTS

In this section, we analyze the impact of referral coupons on customer behavior in the campaign period. We focus on two metrics, namely purchase incidence and purchase amount. First, we quantify the aggregate impact of the campaign on customer behavior. Next, we investigate whether the effect of referral coupons is heterogeneous across customers. Finally, we synthesize the findings and propose explanations for how referral coupons affected customer behavior.

Aggregate Effect of Referral Coupons

We first assess whether referral coupon is more effective than regular coupon for converting a customer (primary recipient) to purchase during the campaign. Figure 3 displays the average purchase probability for a customer by whether he or she was exposed to regular or referral coupon. The regular coupon induced consumers to purchase more so than the referral coupon. The difference between the two groups is quite striking. Specifically, whereas 9.05% of customers in the regular coupon group purchased during the campaign, only 7.22% did so in the referral coupon group ($p = .002$). The average revenue conditional on purchase is not statistically different across the groups, \$30.16 in the regular coupon group and \$32.43 in the referral coupon group ($p = .391$). In sum, while the referral coupon did not affect the purchase amount during the campaign, it had a strong negative impact on the purchase propensity. The average revenue of the regular coupon group is \$2.73 while that of the referral coupon group is \$2.34 ($p = .170$).

Insert Figure 3 about here

Before discussing customer heterogeneity in the response to the campaign, we describe how the individuals exposed to referral coupon behave in terms of sharing the coupons. Out of 4,291 primary recipients in the referral coupon group, 359 (8.37%) customers shared the coupon

with other customers. Secondary recipients downloaded 759 coupons and 68 of these were redeemed.⁴ Table 2 shows that primary recipients in the referral coupon group who refer the coupon have a significantly higher purchase rate (45.68%) as compared to those who do not (3.71%). Focusing only on the people who accepted the encouragement (i.e., referred the coupon to other customers) and comparing them to the regular coupon group, one would erroneously conclude that the campaign with referral coupons was successful. Clearly, whether an individual customer shares the coupon or not is a decision and hence, due to this self-selection, a causal impact cannot be assessed by comparing only referrers to customers in the regular coupon group. It is important to include customers who were exposed to the referral coupon but did not share it.

Insert Table 2 about here

Customer Heterogeneity in Campaign Response

It is likely that customers differ in their responses to the coupon campaign. Understanding such variation in campaign response is important theoretically because it can help in uncovering potential underlying mechanisms through which the referral coupon campaign influenced customer behavior. It is important managerially as well, as it can help in finding better targets for future campaigns.

To determine the customer characteristics likely to yield the most insights into how customers respond differently to the campaign, we leverage previous work on customer relationship management (e.g., Fader, Hardie, and Lee 2005, Blattberg, Kim, and Neslin 2008).

⁴ In a single “share” or referral encounter, a primary recipient may select as many secondary recipients as she wants. As this referral activity was conducted through the platform of the instant messaging service and due to privacy concerns, we cannot observe how many friends a primary recipient selected in a single referral occasion. What we observed was the number of coupons downloaded by secondary recipients, but not their identities. When secondary recipients who downloaded the coupons redeemed the coupons at the retailer, we observed their purchase behavior. Thus, we can determine the monetary value generated by each primary recipient, including the purchases made by the secondary recipients through his or her referrals.

This research has documented that customers' past transaction history can be summarized using their recency, frequency, and monetary value (RFM) measures. Additionally, these measures also capture behavioral loyalty (e.g., Kumar and Shah 2004). Thus, we use RFM characteristics based on the individual-level data over the 13-month pre-campaign period to address customer heterogeneity in campaign response.

We group customers by conducting a median split on each of the three RFM characteristics and compare the effect of the two types of coupons across segments. Table 3 shows that the effect of the treatment on customer purchase behavior during the campaign varies across segments. The effect of exposure to referral coupons on the propensity of the primary recipients to purchase is less negative for customers with lower recency, higher frequency, and higher monetary value. In particular, while the average difference in propensity to purchase between customers in regular and referral coupon groups is 1.83 percentage points, those customers with higher frequency (monetary value) show a difference of only 0.86 (1.08) percentage points. In contrast, customers with lower frequency (monetary value) show a larger difference of 2.57 (2.58) percentage points. The effect of the treatment on customer revenue was also heterogeneous. The referral coupon increased revenue for customers with lower recency, higher frequency, and higher monetary value. Nevertheless, the magnitude of the effect on revenue is rather small, ranging from $-\$3.90$ to $\$0.30$ across all groups. It appears that the primary impact of the exposure to referral coupons is on altering the propensity to purchase.

Insert Table 3 about here

These results suggest that the effect of exposure to referral versus regular coupon varies across customers' RFM. To better assess the effects, we estimate a binary logit model using the purchase incidence of the primary recipient as the dependent variable. The analysis is

straightforward because of the randomization induced by the field tests. In particular, we model the probability of primary recipient i purchasing during the campaign as follows:

$$\text{Prob}(\text{Purchase}_i | \boldsymbol{\beta}, R_i, \mathbf{X}_i) = \text{Prob}(\beta_0 + \beta_1 R_i + \beta_2 \mathbf{X}_i + \beta_3 R_i \mathbf{X}_i + \varepsilon_i > 0), \quad (1)$$

where R_i is a dummy variable that takes a value of 1 if the customer received the referral coupon and 0 otherwise (i.e., received the regular coupon). The vector of covariates \mathbf{X}_i contains RFM characteristics based on pre-campaign behavior. The vector $\boldsymbol{\beta}$ contains the parameters, including the constant (β_0). The parameter β_1 measures the effect of a customer being exposed to the referral coupon on their propensity to purchase during the campaign while the parameter β_2 controls for the effect of RFM characteristics. The parameter β_3 measures whether being exposed to the referral coupon moderates the impact of RFM characteristics on the propensity to choose. Finally, ε_i denotes the error term, which is assumed to be logistically distributed with mean 0 and variance $\frac{\pi^2}{3}$. We mean-center all continuous variables (e.g., frequency) so that the main effect of the treatment (β_1) in the model with the full set of interactions represents the effect corresponding to the “average” customer.

Table 4 shows the results for the purchase model. Column 1 presents results for the specification implied by Equation (1) but without the RFM controls. The point estimate suggests that exposure to referral coupon decreased the propensity to purchase during the campaign. The results in column 2 repeat the analysis with the controls for the RFM characteristics. The result shows that the pre-campaign descriptors have a significant impact on the propensity of the primary recipient to respond to the campaign. Note that after controlling for RFM measures, the main result holds. This is reassuring and suggests that our result is not an artifact of a failure of randomization. In columns 3-5, we test for heterogeneity in the effect of the referral coupon by interacting the RFM characteristics (one variable at a time) with a binary indicator for whether

the customer was exposed to referral coupon. A comparison of these three columns indicates that the effectiveness of referral coupon improves for customers with higher frequency and monetary value. The model specification in column 6 includes all interactions with the RFM characteristics. None of the interactions is significant. It is likely due to the high correlation between frequency and monetary value in our data ($r = 0.64$) and a moderate correlation between recency and frequency ($r = -0.36$). In addition, the model specification has a worse AIC than those in columns 4 and 5.

To address the concern of collinearity in column 6, we conducted a factor analysis using all three RFM measures. The factor analysis revealed a single factor accounting for 64% of the total variance in the three variables.⁵ In column 7, we apply a model specification with the single factor as an explanatory variable, together with the indicator variable for exposure to the referral coupon and their interaction. The results indicate that the effectiveness of referral coupon significantly improves for customers with higher factor scores.

Insert Table 4 about here

We next assess the underlying drivers of the referral behavior. To this end, we include the customers in the referral coupon group and estimate a logit model for whether or not the primary recipient in the referral group shared the coupon, using their pre-campaign descriptives. Table 5 shows the results. Column 1 presents the analysis with the controls for the RFM characteristics. The result suggests that customers who had recently purchased and were more frequent purchasers are likely to share the coupon with other customers. Similar to the analysis for the propensity to purchase, we address the concern of collinearity among the RFM variables in

⁵ The loadings of recency, frequency and monetary value on the single factor were -0.66 , 0.87 and 0.84 , respectively. Thus, lower recency, higher frequency and higher monetary corresponds to a higher factor score.

model specification in column 2. The results indicate that referral is significantly higher for customers with higher factor scores.

Insert Table 5 about here

Discussion of the Results

To summarize, exposing consumers to referral coupons that encourage them to share with others significantly decreased their own purchase propensity. While 9.05% of customers in the regular coupon condition purchased during the campaign, only 7.22% in the referral coupon group did so. Customers with low frequency and monetary value are those for whom the referral coupon decreased the purchase most. We next provide two possible explanations for this decrease in the own propensity of the primary recipient to purchase: brand persuasion and cognitive cost of making referrals.

Brand Persuasion and Trust

Consumers have beliefs about how brands try to persuade them and how they can cope with such persuasion attempts (e.g., Freistad and Wright 1994, 1995). The persuasion knowledge model provides a framework for how consumers interpret and respond to offers. Consumers' persuasion knowledge includes their beliefs about marketers' motives and appropriateness of persuasion techniques. Much work has since investigated the factors that trigger the use of persuasion knowledge. For instance, Campbell and Kirmani (2000) note that when the situation makes ulterior motives accessible, it can encourage consumers to use such schema. Consumers who believe that an influencing agent may have a hidden motive for its behavior are less trusting

(e.g., Fein 1996) and suspicion of the underlying motives can result in less favorable perceptions of the agent and the offer (e.g., Fein, Hilton, and Miller 1990).

In our context, the RFM measures capture behavioral loyalty (e.g., Kumar and Shah 2004) and past work in the area of service marketing shows a positive link between customer loyalty and trust (e.g., Lau and Lee 1999, Aydin and Ozer 2005). Recent work also documents that customers who are less loyal have a more skeptical mindset to firm's offerings (e.g., Thompson and Malaviya 2013). Taken together, we suggest that customers with low level of pre-existing commitment to the firm, as reflected in their RFM measures, are less likely to trust the firm and, when exposed to referral coupons, may feel that the firm has an ulterior motive— e.g., it is trying to persuade them to purchase as well as making use of their social connections to generate awareness of the communication. Such perception can cast a negative light on the entire communication itself and their desire to make a purchase. Conversely, customers with a high level of commitment will be more trusting and less likely to infer any ulterior motive upon receiving the referral coupon. They may also be keen to reward the firm by considering who among their friends may like the coupon. Our study provides supportive evidence for this mechanism at work: customers with higher level of commitment with the firm are more likely to purchase and share the coupon as well.

Cognitive Cost of Referrals

Referrals can be onerous as primary recipients have to consider who among their friends will like the coupon and what signal would be conveyed to these friends (e.g., Folkes 1984, Gatignon and Robertson 1986, Ryu and Feick 2007). In addition, past work suggests that sometimes small or

token costs can have a disproportionate effect on consumers' decisions (e.g., Cheema and Soman 2008).

For our context, the primary recipients with low commitment to the firm may be less likely to recall others who like the firm, which in turn can make their cognitive cost of making referrals high. Such high referral cost may act as a barrier and deter them from acting on the communication even for themselves. Conversely, the primary recipients who have a high level of commitment with the firm, as reflected in their RFM measures, may more easily recall others who like the campaign due to homophily (e.g., McPherson, Smith-Lovin, and Cook 2001). This would suggest that for such customers with high commitment, there is a lower cognitive cost of making referrals.

Managerial Impact of Referral Campaign

The average net revenue from the primary recipients' own purchases in the referral coupon group (\$2.34) is lower than those from the primary recipients in the regular coupon group (\$2.73). Our analysis has thus far ignored the revenue contributed by secondary recipients. From a managerial perspective, an important question is whether the inclusion of the revenue from secondary recipients can close the gap in average revenue between the two conditions and even allow the average revenue from the referral coupon group to be higher.

To this end, we compute the revenues originating from all secondary recipients corresponding to a primary recipient and attribute them to that primary recipient (this may be zero if there was no revenue generated from secondary recipients). We term this revenue as the "social-value" of a primary recipient. Upon adding the self and social values of each primary recipient (termed as total value) and averaging across the customers in the referral coupon group,

we find that the net revenue is \$2.72. This is virtually indistinguishable from the average net revenue from the regular coupon group ($p = .997$). In our field test, thus, on average the group with referral coupons does not generate higher revenues (as one would expect) compared to that with regular coupons. However, as we show next, if the firm had targeted customers with referral coupons appropriately, it could generate higher revenues as compared to regular coupons.

TARGETING OF REFERRAL CAMPAIGNS

In this section, we assess the revenue implications of targeting customers with referral coupons. For the purpose of illustration, we use the data from the main study and select the frequency measure as a basis for customer segmentation. We conduct a median split on the frequency metric using customer transactions before the intervention and create four cells by comparing regular versus referral coupons with high and low frequency. Using the data from our randomized field experiment, we then compare behavior during the campaign across cells. Because we have a field experiment and customers are selected on the basis of their pre-campaign behavior, our results do not suffer from endogeneity.

Table 6 shows the potential effects on customer behavior if the company were to run referral campaigns at different segments of customers. The two columns under “Low Frequency” of Table 6 indicate that, consistent with our earlier analysis, customers with low level of frequency have a lower propensity to purchase upon being exposed to referral coupon (4.26%) as compared to regular coupon (6.83%). Combining the purchase propensity with the respective conditional purchase amount, the average self-value from the referral coupon group (\$1.23) is lower than that from the regular coupon group (\$1.93). In the referral coupon group, we combine the self-value together with the social-value associated with the primary recipients to determine

the average total value (\$1.45). The total value from the referral coupon group is lower than the (total) value from the regular coupon group.

The two columns under “High Frequency” of Table 6 indicate that, consistent with our earlier analysis, customers with high level of frequency have a similar propensity to purchase upon being exposed to referral coupon (11.13%) or regular coupon (11.99%). Combining the purchase propensity with the respective conditional purchase amount, the average self-value from the referral coupon group (\$3.81) is similar to the regular coupon group (\$3.79). In the referral coupon group, we combine the self-value together with the social-value associated with the primary recipients to determine the average total value (\$4.42). Note that for this group, the total value from the referral coupon group is higher than the (total) value from the regular coupon group. Thus, whether referral coupons are more or less effective in generating sales than regular coupons depends on whether frequent customers are targeted as primary recipients.

Insert Table 6 about here

ROBUSTNESS AND ADDITIONAL DISCUSSION

In this section, we test the robustness of our findings and explore additional explanations for the phenomenon we observe in the data. Using a second field experiment, we show the robustness of our key finding with other types of promotions. Next, we seek to understand which of the two explanations proposed thus far (brand persuasion and referral cost) is likely to work. To this end, we consider a third field experiment in which we highlight customer value to the firm in referral coupon campaigns. Finally, we discuss other alternative explanations.

Type of Promotions: Study 2

The empirical context discussed in the main study involved coupons with price discounts that recipients (primary or secondary) could redeem during the campaign while purchasing any product that the retailer offered. We conducted a second study to assess whether our main finding is robust to other types of promotions. Specifically, we focus on free sample promotions. Despite their popular use in practice, research probing the effects of free sample promotions is rather limited (e.g., Lammers 1991, Gedenk and Neslin 1999, Bawa and Shoemaker 2004). This campaign was run by a retailer, owned by the same company which ran the main study. It was run during approximately the same time as our first study. In this campaign, consumers receive free samples upon purchasing any among featured products.

For the campaign, 48,175 customers were randomly selected of whom 14,467 customers (30%) were allocated to the regular coupon group and the remaining 33,708 to the referral coupon group.⁶ There was no overlap between these customers and those in our main analysis. Customers in both groups were contacted via mobile phones by the firm. The communication included a few featured products, and if consumers purchased any of those featured products, they could receive free samples. In the regular coupon condition, free samples could be obtained only by primary recipients. In the referral coupon condition, primary recipients could use free sample coupons for themselves and in addition share the firm's communication with another person. Thus, the mode of communication with customers and how coupons were distributed were identical to the main study.

We find that 1.31% of customers in the regular coupon group made a purchase as compared to 1.09% in the referral coupon group ($p = 0.045$). This result is in line with what we found in the main study, suggesting that our key finding is robust to the type of promotion.

⁶ Table A1 in Appendix A presents the individual-level data in the pre-campaign period. It supports that there is no systematic variation between the two conditions.

Deeper Exploration of Mechanisms: Study 3

Our main result can be explained based on two mechanisms: trust and brand persuasion, and lower cognitive cost of referral due to homophily. To further understand the underlying mechanism at work, we assess a third campaign run by a retailer, owned by the same company which ran the two studies discussed so far. This campaign was run for a period of one week during approximately the same time as our two studies.

In order to understand which of the two mechanisms is likely at work, we considered informing customers about their value to the firm as a treatment in referral coupon campaigns. Uninformed referral coupons, which are identical to the referral coupons in our main study, provide a baseline for comparing the effect of informed referral coupons. As providing information to customers about their value to the firm should minimally (or not at all) alter the cognitive cost of a customer to make referrals i.e., any cost of making referrals should remain unaffected by our treatment. The treatment would likely enhance trust as the company is being honest and providing customers with information about their value (e.g., Erdem and Swait 2004, Urban 2004). With customers perceiving more trust in their relationship with the firm, upon receiving the coupon, they may reciprocate with a high purchase propensity, perhaps even high purchase value, and put more effort to share the coupon with suitable customers (e.g., Goulder 1960). The latter is consistent with active screening based matching (e.g., Kornish and Li 2010). Thus, if we do find that customers' propensity to share the coupon with their friends and the quality of their referrals (as measured by the social-value generated from these referrals) change upon receiving referral coupons with information about their value, then trust and brand persuasion is the more likely mechanism driving customers' response to referral coupons.

For this campaign, all customers, who had previously purchased from the retailer in the one year duration before the intervention and were deemed to be in the top decile of the customer base in terms of their value, were eligible for inclusion in the randomized field experiment. The firm determined customer value based on a combination of RFM of the transactions of the year before the intervention. There were also no other activities targeted toward these customers during the campaign itself. Of the customers who satisfied the criteria of top decile in the customer base, 18,168 were randomly selected to be included in the experiment.⁷ There was no overlap between these customers and those in the other two studies.

This randomized field experiment involved two different types of referral coupons. Similar to the other two studies, customers included for this campaign were contacted via mobile phones by the firm. The communication from the firm included a price discount coupon that a primary recipient could redeem within the duration of one week on purchasing any product offered by the retailer. One group (9,089 customers) received the referral coupon, similar to the referral coupon in the main experiment, which they could share the coupon with as many other people as they wished. In addition, the firm made customers aware of their value to the firm by informing them in the communication that they were in the top decile of the customer base (informed referral coupon group). Another group (9,079 customers) received the same referral coupon, but the firm did not include any information regarding customer value in the campaign communication. This condition was identical to the referral coupon condition in the main experiment (uninformed referral coupon group), and provides a baseline for comparing the effect of highlighting the value of customers in referral coupons. Note that all the customers included in

⁷ Table A2 in Appendix A presents the individual-level data in the pre-campaign period. There is no systematic variation between the two conditions.

this randomized field experiment were in the top decile of customer base, but only half of them were informed about their value.

We compared the impact of the two different types of referral coupons, with and without information about customer value, on customer behavior and firm revenue. Table 7 presents the results. In the uninformed referral coupon group, 2.32% of customers purchased during the campaign, while 2.79% did so in the group with information about their value ($p = 0.047$). Furthermore, there was a statistically significant difference in the average conditional revenue between the two groups, \$17.49 in the informed referral coupon group and \$14.10 in the uninformed referral coupon group ($p = 0.009$). Taken together, the group without information about their value generated about \$0.33 on average in self-value while the group with information about their value generated \$0.49 on average in self-value ($p = 0.002$).

Insert Table 7 about here

In terms of referral behavior, in the uninformed referral coupon group, 236 out of the 9,079 (2.60%) primary recipients shared the coupon with others. In the informed referral coupon group, 316 out of 9,089 (3.48%) primary recipients did so, a significantly higher level of sharing the campaign ($p = 0.001$). Combining the self-value from primary recipients with their social-value (derived from the purchase behavior of the secondary recipients), the average total value from the uninformed referral coupon group is about \$0.37 while from the informed referral coupon group is about \$0.57 ($p < 0.001$). Thus, on all the metrics of the campaign performance, the group with information about their value to the firm performed better.

In sum, the results suggest that there is a higher level of response from primary recipients upon being exposed to referral coupons wherein they are informed about their value to the firm—primary recipients generate higher self-value, are more likely to share the coupon with their

friends, and do so with secondary recipients who generate more value for the firm. Thus, trust and brand persuasion is the more likely mechanism for how consumers respond to referral coupons.

Exclusivity of Coupons

Consumers' evaluations of coupons depend on their exclusivity, in addition to their monetary savings (e.g., Chandon, Wansink, and Laurent 2000). Consumers tend to view exclusivity positively (e.g., Dreze and Nunes 2009) and exclusive offers lead to higher redemption rates (e.g., Feinberg, Krishna, and Zhang 2002, Venkatesan and Farris 2012). In line with this past work, referral coupons may seem less attractive, as compared to regular coupons, as they are not exclusive and shareable. Thus, lower redemption for primary recipients of the referral coupon may arise from its non-exclusivity. While plausible, the data from our studies suggests otherwise. If exclusivity were the primary driver of low redemption of the referral coupon, customers with high commitment to the firm should be less responsive to the offer when compared with customers with low commitment. This is because the former have a stronger relationship with the firm and may expect exclusive offers that reward them for their commitment. In the main study, however, we find the customers who have high propensity to purchase also have a high propensity to share the communication from the firm. Similarly, in Study 3, the informed referral coupon group finds the referral coupon to be more attractive than the group that is not informed about their value. Overall, it suggests that customers with high commitment act as brand ambassadors when exposed to referral coupons—they are happy to purchase for themselves as well as spread the communication to others.

Deal Availability

Classic work on consumers' motivations to share suggests that people may be less likely to share deal related information if they believe that they themselves may not be able to redeem it (e.g., Frenzen and Nakamoto 1993). While this mechanism cannot explain the lower redemption under the referral coupon as compared to the regular coupon, it suggests that if people are concerned about deal availability, they should redeem the coupon for themselves and not share it with others. The data from our main study shows that about 53% (= 164/310) of customers who purchase also share the coupon. Such a high percentage of sharing of the coupon among purchasers indicates that there is little concern about deal availability. In addition, the level of sharing is higher among people with a high propensity to purchase. We also confirmed with the firm that they had never had a stock-out with any promotions they had done before.

GENERAL DISCUSSION AND CONCLUSIONS

Firms frequently employ coupon promotions to increase the propensity to purchase among their customers. With the advent of new technology, it has become easier for firms to communicate with their customers and for customers to communicate with each other. Inspired by the success of referral programs by service companies (e.g., Dropbox, PayPal, Airbnb) to acquire new customers, retailers have begun offering referral coupons. These coupons provide benefits to customers that a firm directly communicates with (i.e., primary recipients) but also for other customers who may receive these coupons to redeem from primary recipients. These types of coupons could generate more revenues than regular coupons, which can only be redeemed by primary recipients. At the same time, customers may find making such referrals to be onerous and also question the underlying motives of the firm to offer such promotions.

This research evaluates whether firms indeed benefit from referral campaigns that customers could redeem for themselves and also share with others. We use three large-scale field experimental data from a beauty company to assess whether campaign communication with regular or referral coupon is more effective.

In our main study, we find that exposing customers to referral coupons can, surprisingly, reduce their own redemption of the coupon as compared to regular coupons. We find this key result in a second field test in which the referral coupons provide a free sample as opposed to a price discount. We propose two explanations for this phenomenon, namely, trust and brand persuasion paired with active matching, and cognitive cost of referrals paired with passive matching from homophily. The analysis from a third field experiment provides empirical evidence that brand persuasion is the more likely mechanism of how consumers respond to referral coupons. Finally, we demonstrate how firms could target customers on the basis of easily observed characteristics, such as frequency of prior purchases, to improve the performance of referral campaigns. This last finding should help managers think more about how customization of referral campaigns may impact customer behavior and firm revenues in promotion campaigns.

Our research complements extant work on price discount coupons and temporary price reductions (e.g., Kumar and Pereira 1995, Leone and Srinivasan 1996, Ailawadi, Lehmann, and Neslin 2001) and the effects of free sample promotions (e.g., Gedenk and Neslin 1999, Reinartz and Kumar 2000). We take one step further and investigate how sharable coupons impact customer redemption. Our research also complements the emerging literature on the impact of referrals on firm profits. Schmitt, Skiera, and Van den Bulte (2011) have documented that referred customers may have higher profitability for a service firm with recurring transactions. Our focus, in contrast, is on the impact of referral requests on the behavior of potential referrers

themselves in a one-shot setting. In addition, our work adds to a growing body of literature studying the effect of mobile promotions (Danaher et al. 2015, Luo et al. 2014, Fang et al. 2015, Fong, Fang, and Luo 2015).

Broadly, this research adds to past work on the impact of choice architecture on consumer behavior (e.g., Thaler and Sunstein 2008). Choice architecture is the idea that the way choices are described to consumers can have a substantial impact on what they choose (see Johnson et al. 2012). One of the key factors for the success of any choice architecture is the level of freedom consumers perceive in their decisions (e.g., Sunstein and Thaler 2003). A libertarian (or soft paternalism) policy suggests that people should be allowed to accept any recommendations on their own volition. In our context, while the firm included a call-to-action for referrals, customers did not have to follow that recommendation. Our results suggest that merely exposing customers to a call-to-action can have negative consequences for the firm (see Ascarza, Iyengar and Schleicher 2016 for another example).

There are a number of directions in which our research can be extended. First, our research was undertaken in a one-shot setting in which customers were exposed to promotion coupons. In this empirical setting, we find the short term impact of referral coupons during campaign period. It will be useful to examine whether such campaigns have longer term impact on customer behavior and firm revenues (e.g., Kumar and Pereira 1995, Leone and Srinivasan 1996, Mela, Gupta, and Lehmann 1997, Ailawadi, Lehmann, and Neslin 2001), similar to post acquisition benefit of referral programs documented by Schmitt, Skiera, and Van den Bulte (2011). Second, our key result of lower redemption of referral coupons is robust regardless of whether the coupon offers a price discount or a free sample. Yet, we do not explicitly address the specifics of communication design in referral campaigns. Past work suggests that the effect of

promotions may vary depending on their characteristics and benefits offered (e.g., Gedenk and Neslin 1999, Ailawadi, Neslin, and Gedenk 2001). It will be interesting to systematically investigate how the impact of referral coupons may vary by their characteristics (e.g., incentives), since work in the area of word-of-mouth shows how different product characteristics change the propensity of customers to spread information about them (e.g., Frenzen and Nakamoto 1993, Berger and Schwartz 2011). Third, in our context, we consider referral coupons that offered no monetary benefits to primary recipients for their referrals. There is work that suggests that whether referral rewards change the likelihood of referral depends on the nature of the tie between referrer and referee (e.g., Ryu and Feick 2007). In particular, referral rewards may not be needed when there is a strong tie between referrer and referee whereas rewards are useful when there is a weak tie. Other work suggests that extrinsic rewards may lower people's interest in what are intrinsically motivated activities (i.e., sharing the coupon so that more people benefit). Please see Lepper and Green (1978) and Frey and Jegen (2001) for a discussion of the crowding out effect. As several companies do compensate their customers for referrals (albeit for new customer acquisition) with monetary rewards, it will be useful to assess how such incentives may impact the success of referral promotions of the type we have explored. For instance, monetary incentives may change the number of primary recipients who are interested in sharing but more interestingly, it may also impact who the coupon is shared with. We hope that future research will address these issues.

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Table 1: Pre-campaign Descriptive Statistics of the Main Study

	Regular Coupon	Referral Coupon
Days since most recent purchase		
Mean	40.42	40.56
p10	5.00	5.00
p25	12.00	12.00
p50	28.00	28.00
p75	49.00	49.00
p90	99.00	98.00
Number of products purchased		
Mean	38.23	38.41
p10	14.00	14.00
p25	19.00	19.00
p50	29.00	30.00
p75	48.00	49.00
p90	73.00	74.00
Number of purchases		
Mean	11.20	11.07
p10	6.00	6.00
p25	7.00	7.00
p50	10.00	10.00
p75	14.00	14.00
p90	19.00	18.00
Average amount (\$)		
Mean	33.30	33.58
p10	15.74	16.07
p25	20.32	20.50
p50	27.60	27.88
p75	39.39	40.06
p90	56.20	57.06
Observations	4252	4291

Average amount is the individual average purchase amount based on pre-campaign behavior.

Table 2: Campaign Purchase Behavior by Referral

	Regular Coupon	Referral Coupon	
		Refer	Not Refer
Number of customers	4252	359	3932
Percent of customers purchasing	9.05	45.68	3.71
Conditional purchase amount (\$)	30.16	32.47	32.39

Table 3: Campaign Purchase behavior by Customer Characteristics

	N	Probability of Purchase (%)			Purchase Amount (\$)		
		Regular Coupon	Referral Coupon	Diff.	Regular Coupon	Referral Coupon	Diff.
All customers	8543	9.05	7.22	1.83	30.16	32.43	-2.27
By Recency							
< 28	4263	10.89	9.08	1.81	30.29	34.19	-3.90
≥ 28	4280	7.18	5.42	1.76	29.96	29.58	0.38
By Frequency							
> 10	3686	11.99	11.13	0.86	31.59	34.22	-2.63
≤ 10	4857	6.83	4.26	2.57	28.25	28.90	-0.65
By Monetary value							
> \$267	4269	10.78	9.70	1.08	34.30	36.04	-1.74
≤ \$267	4274	7.33	4.75	2.58	24.09	25.08	-0.99

The cut-off point in each RFM measure was selected as the closest integer value to the median split. All measures for segmenting customers are based on pre-campaign behavior.

Table 4: Heterogeneous Effects of the Referral Coupon on Purchase

	Main Effect	RFM Controls	Recency Interaction	Frequency Interaction	Monetary Interaction	All Interactions	RFM Factor
Referral coupon dummy	-.246*** (.080)	-.237*** (.081)	-.247*** (.086)	-.282*** (.084)	-.223*** (.081)	-.235*** (.093)	-.297*** (.085)
Recency		-.006*** (.001)	-.006*** (.002)	-.006*** (.001)	-.006*** (.001)	-.007*** (.002)	
Frequency		.048*** (.007)	.048*** (.007)	.039*** (.009)	.048*** (.007)	.044*** (.010)	
Monetary value		.097 (.077)	.097 (.077)	.093 (.077)	-.011 (.093)	.012 (.104)	
RFM factor							.446*** (.056)
Referral coupon dummy × Recency			-.001 (.003)			.001 (.003)	
Referral coupon dummy × Frequency				0.021* (.011)		.011 (.015)	
Referral coupon dummy × Monetary value					0.238** (.115)	.183 (.155)	
Referral coupon dummy × RFM factor							.173*** (.086)
Constant	-2.307*** (.053)	-2.386*** (.059)	-2.381*** (.060)	-2.368*** (.060)	-2.396*** (.060)	-2.391*** (.063)	-2.387*** (.056)
Observations	8543	8543	8543	8543	8543	8543	8543
Log-likelihood	-2424	-2324	-2324	-2323	-2322	-2322	-2330
AIC	4661	4659	4661	4657	4657	4660	4668

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors appear in parentheses. Results are from a logit model with purchase incidence as dependent variable. The variables recency, frequency, and monetary value (with logarithm transformation) have been mean-centered.

Table 5: Parameter Estimates of Referral Behavior

	RFM Controls	RFM Factor
Recency	-.003* (.002)	
Frequency	.044*** (.011)	
Monetary value	.167 (.107)	
RFM factor		.420*** (.055)
Constant	-2.460*** (.058)	-3.187*** (.057)
Observations	4291	4291
Log-likelihood	-1203	-1463
AIC	2415	2930

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors appear in parentheses. Results are from a logit model with referral incidence as dependent variable. The variables recency, frequency, and monetary value (with logarithm transformation) have been mean-centered.

Table 6: Impact of Referral Coupons on Customers by Pre-campaign Frequency

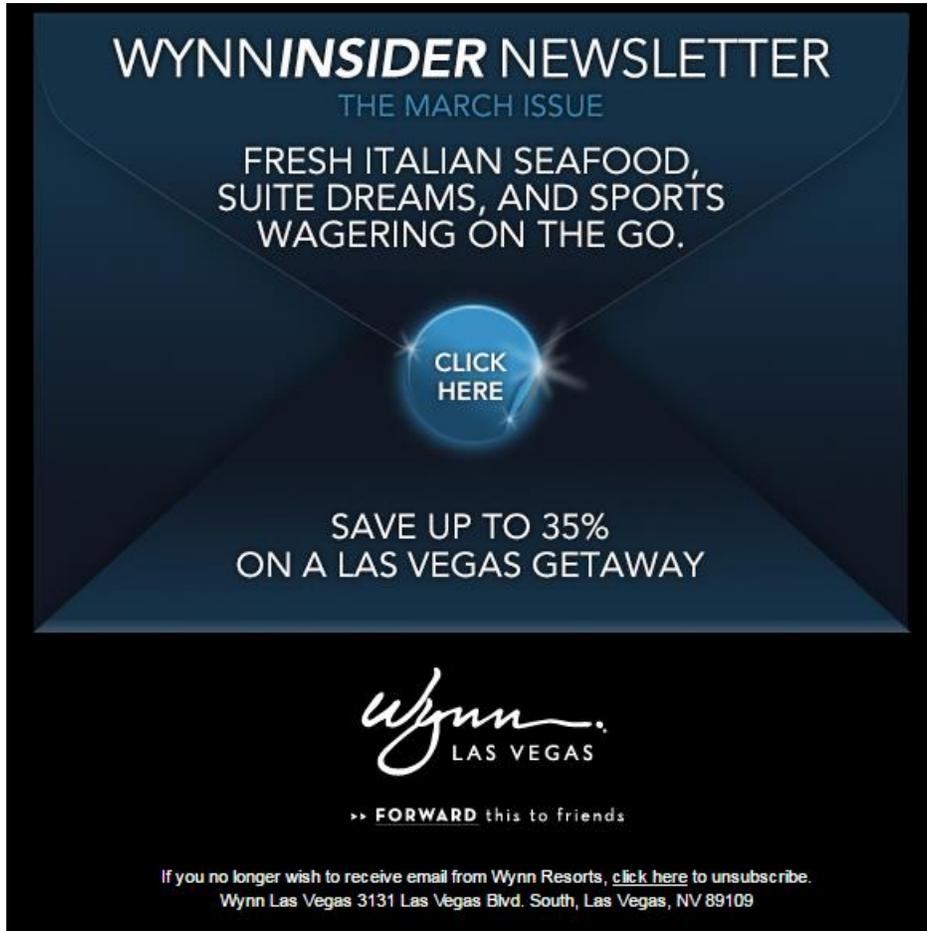
	Low Frequency		High Frequency	
	Regular Coupon	Referral Coupon	Regular Coupon	Referral Coupon
Number of customers	2417	2440	1835	1851
Percent of primary recipients purchasing	6.83	4.26	11.99	11.13
Conditional purchase amount (\$)	28.25	28.90	31.59	34.22
Average self-value (\$)	1.93	1.23	3.79	3.81
Average total value (\$)	1.93	1.45	3.79	4.42

The cut-off point in the frequency measure was selected as the closest integer value to the median split. The frequency measure for segmenting customers is based on pre-campaign behavior.

Table 7: Impact of Highlighting Customer Value in Referral Coupons on Customers

	Uninformed Referral Coupon	Informed Referral Coupon
Number of customers	9079	9089
Percent of primary recipients purchasing	2.32	2.79
Conditional purchase amount (\$)	14.10	17.49
Average self-value (\$)	0.33	0.49
Average total value (\$)	0.37	0.57

Figure 1: Example of Referral Campaigns



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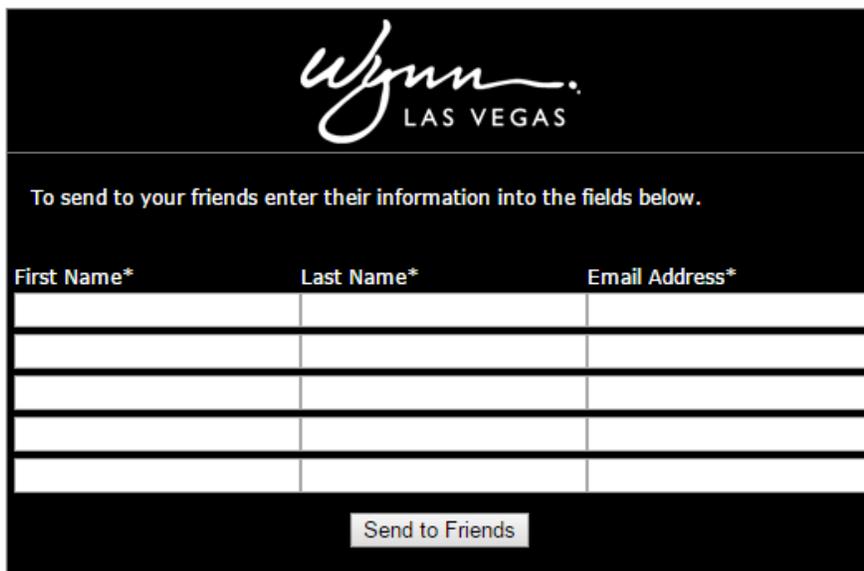
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Figure 2: General Procedure of the Main Study

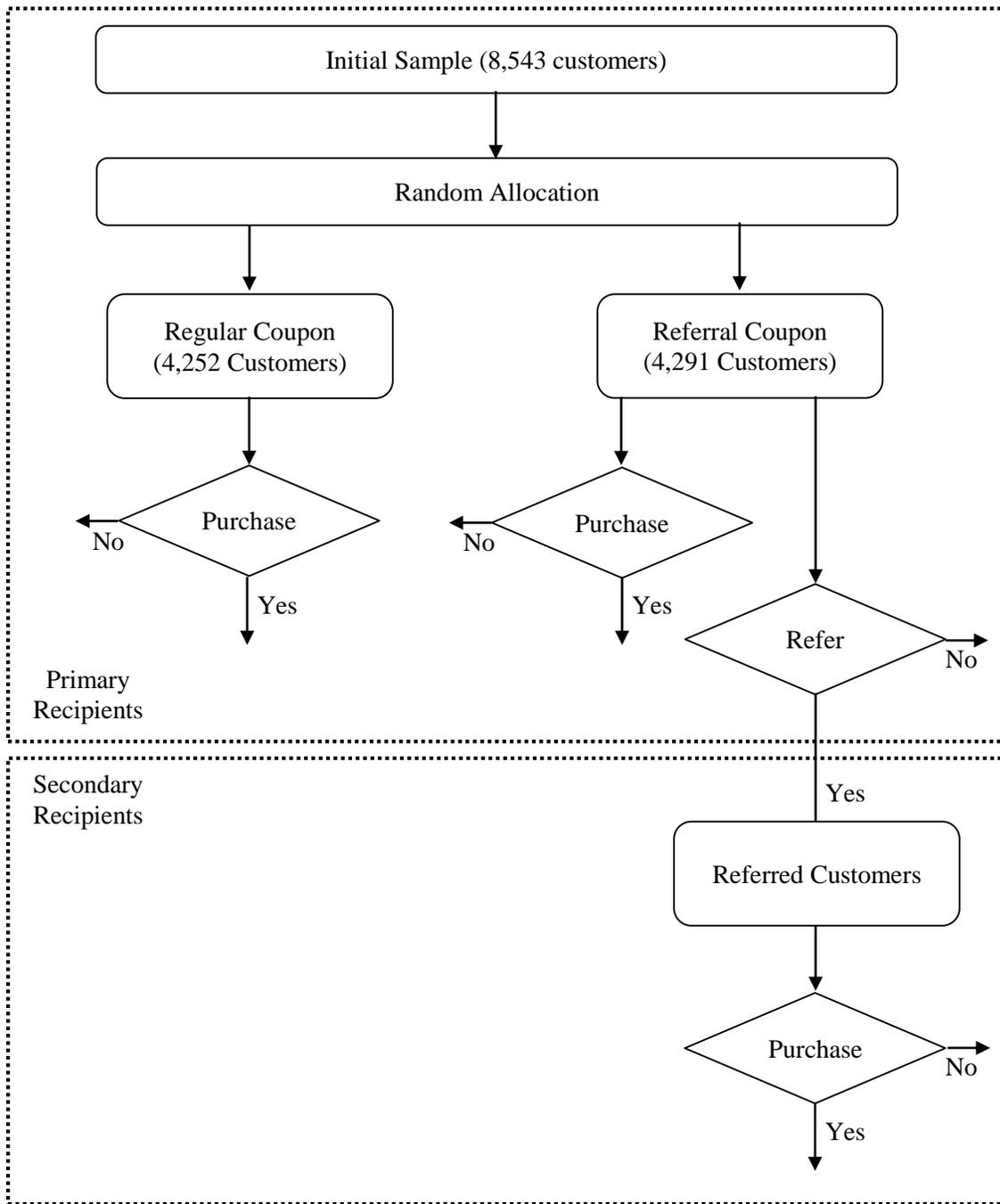
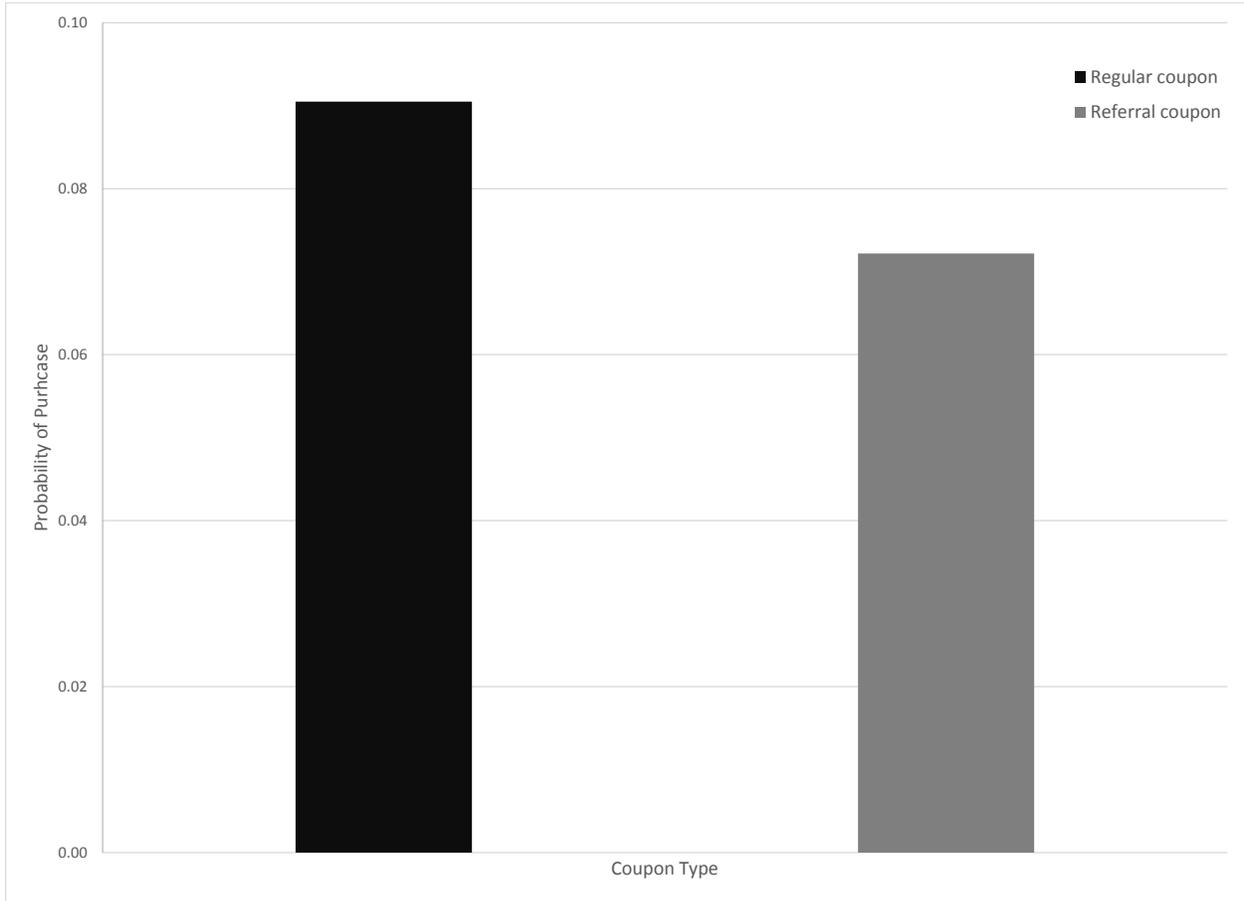


Figure 3: Comparison of Purchase for Regular versus Referral Coupons



APPENDIX

In Appendix, we present the pre-campaign descriptives of the two randomized field experiments which we discussed in the section of additional discussion and robustness. Table A1 summarizes the individual-level data in the randomized field experiment with two different types of coupons (regular and referral) which customers could receive free samples if they purchased any of the featured products. Table A2 summarizes the individual-level data in the randomized field experiment which involved two different types of referral coupons, with and without informing customers about their values. As shown in both tables, the evidence provides further support that there is no systematic variation in the campaign communication.

Table A1: Pre-campaign Descriptive Statistics of Study 2

	Regular Coupon	Referral Coupon
Days since most recent purchase		
Mean	114.89	115.27
p10	22.00	22.00
p25	41.00	41.00
p50	86.00	85.00
p75	161.00	161.00
p90	280.00	280.00
Number of products purchased		
Mean	6.67	6.64
p10	1.00	1.00
p25	2.00	2.00
p50	4.00	4.00
p75	8.00	8.00
p90	15.00	14.00
Number of purchases		
Mean	2.61	2.58
p10	1.00	1.00
p25	1.00	1.00
p50	2.00	2.00
p75	3.00	3.00
p90	5.00	5.00
Average amount (\$)		
Mean	155.14	155.39
p10	45.00	45.00
p25	75.00	75.00
p50	132.33	131.67
p75	190.00	190.00
p90	275.00	276.00
Observations	14467	33708

Average amount is the individual average purchase amount based on pre-campaign behavior.

Table A2: Pre-campaign Descriptive Statistics of Study 3

	Uninformed Referral Coupon	Informed Referral Coupon
Days since most recent purchase		
Mean	71.23	70.38
p10	22.00	21.00
p25	31.00	31.00
p50	61.00	61.00
p75	111.00	111.00
p90	137.00	137.00
Number of products purchased		
Mean	9.90	9.89
p10	4.00	4.00
p25	6.00	6.00
p50	9.00	9.00
p75	13.00	13.00
p90	18.00	18.00
Number of purchases		
Mean	4.59	4.58
p10	2.00	2.00
p25	3.00	3.00
p50	4.00	4.00
p75	6.00	6.00
p90	8.00	8.00
Average amount (\$)		
Mean	16.47	16.45
p10	7.67	7.75
p25	10.39	10.25
p50	14.33	14.32
p75	20.04	20.14
p90	27.50	27.40
Observations	9089	9079

Average amount is the individual average purchase amount based on pre-campaign behavior.